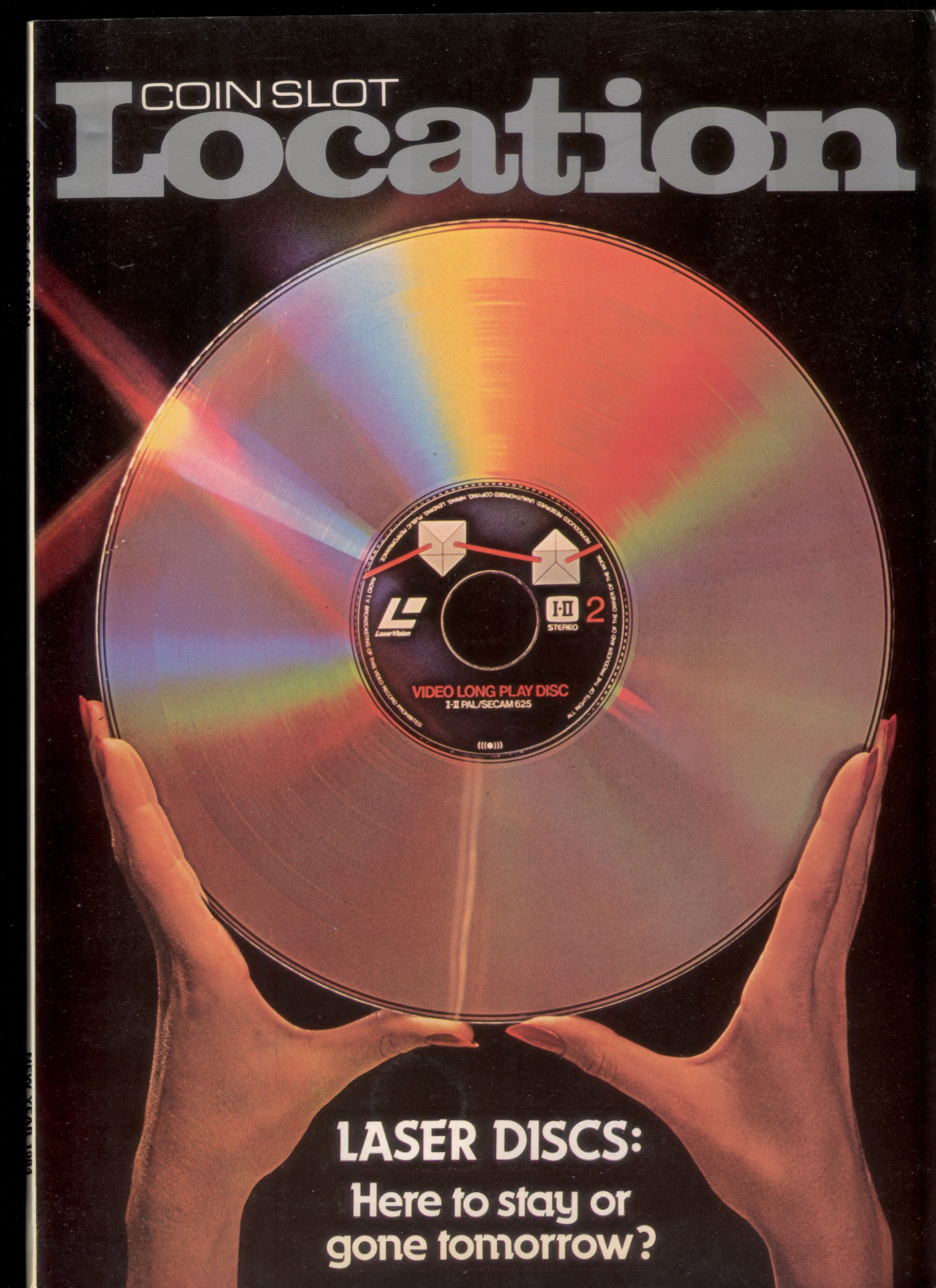
COIN SLOT

Location



LASER DISCS:
Here to stay or gone tomorrow?

NEW 10p CLUB MACHINE

JACKPOT CRAZY

LIVE JACKPOTS

A simple game with Left to Right and Right to Left Payout, combining High Hit Frequency with lots of Jackpots.

LIVE JACKPOTS.

In front of the players eyes 3 LIVE JACKPOTS gradually fill up. One containing up to £56 x 50p. One with up to £34 x 20p and one with up to £13 x 10p. 4 x 7's anywhere in Tic Tac Toe Doe position pays out £10 + whichever LIVE JACKPOT is lit. This eye catching feature is completely new and sure to excite the player, especially as it is DESIGNED TO PAYOUT ONCE A DAY ON A GOOD SITE.

JACKPOTS.

2 x £100, 1 x £50, 1 x £20, 1 x £12.

GAMBLE FEATURE.

Any wins up to £4 may be gambled. The player can gamble ½ or all his winnings and may choose 2-1, 4-1, 6-1 or 12-1 odds on the Roulette wheel feature.

GENERAL.

A super new cabinet with a waist high play panel. The most powerful and attractive artwork ever seen in a Club Machine. Separate Electronic £1 Coin Mechanism, Separate Cash Boxes, Triple M Processor Unit and Reel Mechanism.

THE ONLY LIVE JACKPOT MACHINE AVAILABLE IN THE UK.

Maygay

SIMPLY MONTHS AHEAD

MAYGAY MACHINES LIMITED, PRIMROSE AVENUE, FORDHOUSES WOLVERHAMPTON.
TELEPHONE. WOLVERHAMPTON (0902) 780555 / 780580.

MHG SALES

A GREAT TEAM & SERVICE BACKING

THE PICK OF THE WORLD'S BEST EQUIPMENT

Barcrest

AWPs

Rowe AMI

Juke Boxes & Hideaway Units

ATARI

Videos

MYLSTAR

Pintables and Videos

RAINBOW

Wall Boxes & Jukettes

LEEDS SHOWROOM,
TRADE SPARES COUNTER, SALES & ELECTRONIC REPAIRS
Low Lane, Horsforth, Leeds LS18 4ER
Telephone (0532) 580088

LONDON SHOWROOM,
SALES & ELECTRONIC REPAIRS
718 Tudor Estate, Abbey Road,
London NW10 7UN
Telephone (01) 961 3213/3240

EXPORTING? Tokens are The Answer!

Do you want to operate a Pinball Game on 34 Krupecs? 62 Cruzerios? 29 Francs? 350 Lira? . . . Tokens are the answer. Coin Acceptors and Slide Chutes are easily adjusted for Token Operation. Bill Changers can be quickly modified for cirtually any size Token, and the number of Tokens dispensed can be set for any quantity.

It is important to allow a margin of size difference from the coins in use in any country to prevent slugging. Providing the proper Token is selected, Coin Mechs can be set to eliminate slugging completely.

If you are exporting, importing or operating new or used equipment, you owe it to yourself and to your customers to consider Tokens and all the advantages they offer.

Catalogue and assorted samples are available on request. Phone (606) 231-7100 or write Van Brook of Lexington, Inc. P.O. Box 5044, Lexington, KY. 40555 USA.

COIN SLOT Location NEW YEAR ISSUE 1984

Volume 4:1

Edited by:
DAVID SNOOK
& GERRY WISE

Contributors:
ROGER PEARSON
CLIFFORD RICHARDS
DAVID SNOOK
& GERRY WISE

Production:
ALWYN GREENWOOD
& ERNEST MELLIN

Advertising sales:
STEPHEN WHATMORE
& JOYCE TODD

Advertising Manager:
MICHAEL MELLOR, JR.

International agents:
Coin-Op Journal
503 Julaka Building,
9-23 Togano-Cho,
Kita-Ku, Osaka, Japan

Telephone: 06-315 7739
Telex: 5233863

ISSN 0261-6866

Coin Slot Location is a quarterly magazine printed by Elliott Brothers and Yeoman Ltd., Woodend Avenue, Speke, Liverpool L24 8JL, and published by World's Fair Ltd., P.O. Box 57, Daltry Street, Oldham OL1 4BB, Lancashire England.

Available by subscription only: United Kingdom £10.50. Eire IR£15. Overseas air mail rates include: United States $45, Australia $45, Japan 11,440 Yen, West Germany 73 DM, Italy 38,600 Lira, Austria 508 Schillings, France 184 Francs, Spain 3060 Pesetas, South Africa 44 Rand, Holland 80 Guilder, Belgium 1240 Francs, Denmark 238 Kroners, Switzerland 59 Francs, Norway 183 Kroners, Sweden 176 Kroners, Finland 138 Markka—others and surface rates on request.

COIN SLOT LOCATION
P.O. BOX 57, DALTRY STREET,
OLDHAM OL1 4BB, ENGLAND
Telephone: 061-624 3687
Telex: 667352

LASER GAMES: Here to

IN October 1982 a prototype laser disc game was demonstrated to impassive legions of Japanese operators at the 20th Japanese coin machine exhibition in Tokyo. Barely a year later, around 15-20 examples of the art are currently either in production or are planned.

Indeed, at the Amusement and Music Operators' Association Exposition in New Orleans no fewer than 12 arcade-style games were on show using the technology and there are already products on the market for allied games, such as horse-racing and for music systems.

An assessment of a year of laser games just might serve to get things rather more into perspective, bearing in mind the bold claims of manufacturers and third-hand reports of phenomenal "takes".

It is interesting to look back on that introduction of Sega's Astron Belt in prototype form a year ago and see what the reactions were then. Our sister publication's report on the show, published just days after the event (*Coin Slot*, October 9, 1982) said: ". . . it has to be pointed out that their laser disc system was new only in the technological advances it represented. At the end of the day, it was still a visual, screen-dominated concept . . ."

That was perhaps an understandable and very logical view to take of something utterly fresh in terms of the manner in which it was presented, but it was a view dictated by the universally accepted need for something totally revolutionary.

Undoubtedly the international market needed an injection of fresh novelty—something as different as video games were when they were introduced and therefore a new concept. What we got, in laser games, was the same concept but vastly improved by using a new technology.

The question for the manufacturers is whether they can weave a marketing web of intrigue about the new product to convince operators that the technology gives them a new concept—at least in terms of the cashbox.

The question for operators is whether the laser games will hold up in terms of their "takes" long enough to give a return on the high capital investment. Too many operators naturally remember the cold they caught with video games, which makes the first job for the manufacturers one of education. They have to convince the operators that laser is a different game and should be operated in a different way.

Failing to do so could undoubtedly lead to untold disaster for the manufacturers, spoiled by unprecedented output levels in the halcyon days of video's boom. The "bust" that followed decimated the ranks of "new" operators on an international scale and major manufacturers trimmed their facilities, workforces and in most cases their profits into reverse.

The launch of Astron Belt in Tokyo and more notably the introduction of the first production line models six months' later, was therefore rather more than a straw to be clutched by the manufacturers. Whatever one can say about laser games, the *degree* of difference between the images presented compared with standard video games, renders the equipment "new" in terms of concept.

That second launch of the laser concept came at a little publicised Japanese coin machine exhibition, the Nippon Amusement Operators' Show in Tokyo, in March, 1983 and can be regarded as the real introduction of the game to world markets. A tiny handful of Western coinmen were present to see the production line model of Sega's Astron Belt and its first competitor, a Data East offering called Tarot Card Harmagedon, a somewhat uninspiring piece that bore no relation to their later Bega's Battle.

A month later Cinematronics was to set the Amusement Operators' Exhibition in Chicago alight with Dragon's Lair and cream off a considerable sector of the immediate US market while Sega held back from launching Astron Belt in the US until they were more certain of the concept's acceptance.

That brought the trade through to October's AMOA show in New Orleans and the veritable glut of laser games which is unlikely to show a great deal of lessening over the next few months.

The importance of the game to the world's major manufacturers is patently obvious. Between 1979 and 1981 were two years of amazing growth of the coin-operated video games market, particularly in the US. There the sales of games went from around $150,000,000 to $1,000,000,000 in that short period. "The line went off the graph", said one notable manufacturer when we talked to him recently in

New Orleans. "In 1981 sales were running at one billion dollars, albeit for a month or two, but certainly had it continued then that amount would have changed hands in sales in one year.

"As things stand, sales peaked at a billion dollars and similarly, it was at around one million games that the bottom fell out of the market".

Too many games, indifferent quality, "dumping" from a Far Eastern market which was already creaking, copiers stealing ideas and the growth of plain indifference from the public all contributed. Whatever the reasons, the video games market plunged as quickly as it expanded.

From that peak of one billion dollars in 1981, the estimated 1983 sales are rated by financial experts at no better than between $350,000,000 and $500,000,000—at best halving sales from the boom year.

The shakeout shook many of the video games institutions to their roots. America's majors, Sega, Bally-Midway, Williams, Atari and Stern all went through industrial indigestion which was mirrored in Japan with their giants such as Taito, Namco, Nichibutsu, Konami and Data East.

Everyone suffered, everywhere.

New technology is seen as the answer to a manufacturer's prayer and the early results from Dragon's Lair seemed to indicate strongly that laser games could provide an answer and as more and more manufacturers have leapt on to the bandwagon. The Philips and Pioneers of this world have found, therefore, a boom in sales of commercial laser video disc players from a hitherto unexpected quarter. So much so that Ken Kai, president of Pioneer Video Inc. of New Jersey and a subsidiary of Pioneer Electronic Corp. of Japan, said: "We cannot keep pace with the demand", which must please his group immensely as their $150 million investment in developing laser disc players has not been recouped yet.

For Cinematronics, the Californian-based manufacturers who were first to hit the US market with a laser game it has been a godsend. Nine months before introducing the game the company had filed for Chapter Eleven in the US bankruptcy system, but in two months following the AOE launch of Dragon's Lair the company produced greater revenue than in the whole of the previous year. Now the company is working on its next laser game Space Ace.

Putting the entire business into perspective for the US industry is Don Osborne, marketing vice-president at Atari, who said that laser games are "a new set of paints" for game designers but does not regard the concept as totally revolutionising the coin machine industry. He considers the video disc as a storage system for encoded pieces of information and the most cost-effective manner of storage at present. "There will be other methods in the future", he said, which many people take as a hint that Atari's own development has taken them considerably beyond laser games already.

At the end of the day, the fate of the laser game and of the manufacturers is really down to the way the consumer reacts to the game. In the US in 1982 players spent $5.8 billion in arcades, which was an 18 per cent decline over 1981. The decline will result in a further 25 per cent fall in 1983 and as a result of all this, operators are reducing their ordering by 33 per cent in the current year. The figures, from New York analyst Richard Simon of Goldman, Sachs and Co., also show that consumers will buy around 25 per cent more cartridges for home games.

The figures appear to be borne out by Bally Manufacturing Corporation, whose revenue fell 72 per cent during the first half of 1983 with earnings down 86 per cent. It was a picture repeated time and again and illustrates starkly the reason why the laser game is viewed as such an important innovation.

The majority of the declining figures are from the proceeds of manufacturing and operating traditional video games, in the main. The truth facing the industry is that that type of game, operated in isolation to other coin-operated amusements no longer has sufficient appeal to maintain the level of income that operators once enjoyed from them.

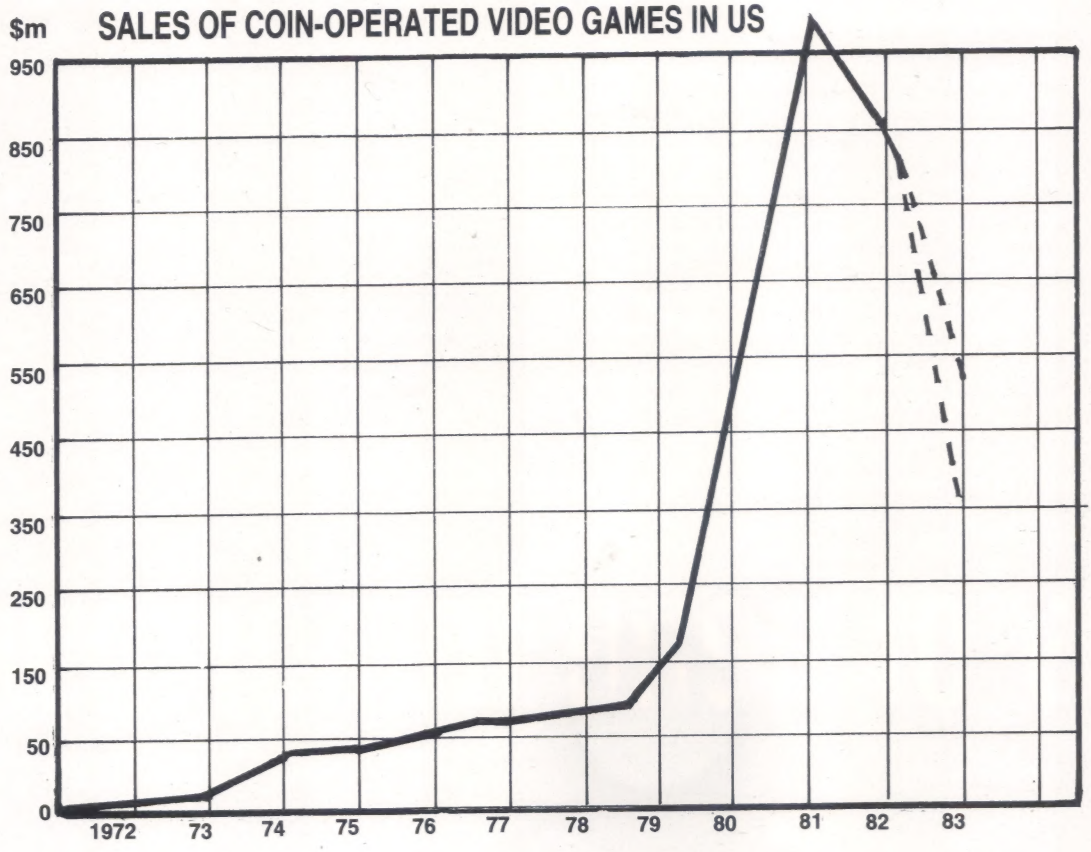
Laser games, for all that they are an extension of video games to the player because they also project a game on to a screen, are obviously such an improvement that they can be regarded as something fresh. Both the manufacturers and the operators hope, therefore that the players regard them as fresh too.

stay or gone tomorrow?

Investment

BUT POLLOCK CLAIMS DEMAND IS IMMEDIATE

MYLSTAR'S Gil Pollock pictured at the European launch of M.A.C.H. 3 in Glasgow with Music Hire's Albert Truelove trying the cabinet for size.



has to be justified!

NO-ONE should be fooled into thinking that the manufacturers of laser disc games will sell as many units as they did with conventional video games, says Gil Pollock, vice-president of sales and merchandising for Mylstar Electronics.

The Chicago-based company is unquestionably one of the current leaders in laser game technology with its highly successful M.A.C.H. 3 game.

But Mr. Pollock, while advocating the use of laser games on all quality sites, is keen to see the whole thing kept in perspective. "You must remember that there is no way that secondary locations can generate enough traffic to justify this level of investment. That is why my company and its competitors will continue to develop conventional video games as well".

Asked what he considered the laser game gave the games manufacturers, Mr. Pollock said: "It gives them a product which because of the charisma of a new technology, has an immediate psychologically acceptable image. There is an immediate market, a demand.

DISCERNING OPERATOR

"The intelligent buyer looks at it to see, initially, whether the product is truly a game. If you think about it, AMOA showed clearly that there are already good and bad laser games. The discerning operator could recognise it straight away and because of that, only good product was and still is, being sold, at least in decent quantities".

He sees the laser disc's place in the market as one purely of novelty which in itself should help regenerate interest in a location. "Our testing has shown that it can have the effect of increasing revenues for a location".

It is not the perfect answer to the ills of the manufacturing trade suffered over the past couple of years, he maintains. "There is no perfect answer in this industry. Each product has to be evaluated on its merits and if you have a commercial, viable product, you can feed your factory and supply your distributor with something which gives him decent margins and decent returns on investment for the operators. We can honestly expect no better from any new piece of equipment, however good.

"The most important thing to any game, laser or video, is that we develop a product with longevity. This bears a direct relationship to the player's attitude. If he becomes bored, longevity is not there and a return on investment is not there".

The principal value in laser games is its role as a new type of technology, he said. He blamed the industry's brittle reputation for overnight stagnation on the human factors, the manufacturers' inability to be consistently creative. "If it dries up all you are doing is producing electronics instead of innovation. That's what leads to close-outs".

He insists that laser games must be treated differently from video games because of the higher costs. "The same criteria that the operator used to judge a good return on investment in video games can still be applied if the operator has a set percentage of what he requires for his return on investment on a laser game. The numbers are different, that's all".

An important element in laser games which is often not considered is the "package", the promise of the manufacturer to provide software to replace the original game when it begins to "dip". This costs a fraction of the original game as the hardware does not figure in the transaction. Nevertheless, Mr. Pollock feels that the operator should still treat his initial investment in a laser game as he would any other product, for write-off purposes. He maintains that the best business method would be to treat new software as an independent transaction and evaluate it separately, giving it a higher return on software than on the original.

Mr. Pollock advocated the values of a competitor's product, which is a surprising but true statement. "Obviously, therefore, I have no axe to grind. If I had an arcade location I would certainly operate a M.A.C.H. 3 and a Cinematronics' Dragon's Lair. The contrast between the two games is quite apparent and therefore the players won't have to make a choice.

"Similarly, the type of games is so diverse one from another that they will attract a high proportion of different players. They will, therefore, tend to support one another rather than conflict.

"It should be emphasised, of course, that the location should have the kind of throughput to justify an investment of that size. I realise that the US market can be different from the European markets, but our testing in the US has shown that a laser game can increase location earnings and that two working together increases the earnings proportionately higher".

What a laser game should be doing for an arcade location is quite clearcut to Mr. Pollock. It should be generating trade, bringing customers back to the premises and when they have played the laser game, they go on to play other games. If it doesn't have that effect, he says, then the site did not justify the investment in the first place. "Most well run, reasonably sized arcades will find their figures swinging up after a laser game is installed" he closed with confidence.

»

GOING to press we were aware of no fewer than 18 laser disc products for the coin machine industry on the market, an immense number in little above a year since the first prototype was launched, particularly in view of the phenomenal costs involved in development.

Surprisingly, they are not all games. In addition to the obvious extensions of what are essentially video game themes, the laser machines on the market also encompass card games, a horse-racing game and three jukeboxes.

The indications are, however, that the competition will intensify still further with major acquisitions in the industry bringing about totally new products. For the moment, however, the would-be laser game buyer might well appreciate a precise run-down on just what is on the international laser game market right now.

WILLIAMS ELECTRONICS sat on the fence and watched the laser build-up for quite a while before launching this Star Rider.

They'd obviously had it in the pipeline for quite a while. No-one brings out a cabinet of that kind of brilliance without a great deal of forethought and planning. The game too is spectacularly good, even with a rear-view mirror to add a new dimension to its play.

In January you will be flying the fastest, most sophisticated video game on the face of this earth.

™ A LASERVIDEO™ GAME

LASER GAMES: Your

ASTRON BELT: The blast-'em space game and the start of it all. The Sega game was the first to be launched nearly 14 months ago in Japan. That was a prototype; the production line model is something else. Long-in-the-tooth by laser game standards, but still challenging with renewed production in Europe and a late release in the United States.

DRAGON'S LAIR: The Cinematronics game which perhaps did more to get the laser game moving than anything else. Launched at AOE in Chicago last spring, it creamed off much of the US laser market before the heavyweight competition moved in. In fact Atari took a licence on it for Europe while the hiccups in their own game were being ironed out. A fantasy extravaganza, Dragon's Lair is probably the most different theme of all.

BEGA'S BATTLE: From Japanese manufacturers Data East and perhaps the only one to challenge the accolade at the end of the Dragon's Lair run-down. A fantasy of brilliant depths, Bega's Battle is certainly one of the most underrated laser games of them all. That perhaps has something to do with the fact that Data East have not been as organised in their publicity and advertising as their opponents.

FIREFOX: Who knows? This issue of *Location* carries an Atari advertisement on their new game, based on the Clint Eastwood film, which nearly made it to AMOA but didn't quite. A cabinet was there but the software wasn't quite right. We expect something mind-blowing, or we really wouldn't expect Atari to make it at all.

CLIFF HANGER : A Stern game with a cartoon basis and a cops and robbers theme which had a certain appeal, spoiled only by the first image on the screen—someone hanging from a gibbet. Remember the media-bashing the trade had from the video game in which you had to mow down people in a car? A gibbet scene could be inviting the same aggravation.

BADLANDS: A little Konami game from Japan which is desperately simple, but is nevertheless a laser game. It is little more than a reaction tester, a quick-draw against a gunslinger exercise with cartoon graphics. Simple fun for arcades.

CUBE QUEST: This was a new laser game from a new company, Simutrek of California. To be frank it was a bewildering adventure through a wonderland of geometry lessons that left our rather jaundiced eye utterly confused. Someone did remark, however, that 16-year-olds understand it immediately, which at the end of the day is what it's all about.

INTER STELLAR: Funai is a Japanese electronics company immensely larger than its unheard-of name suggests. Their's was the first game to directly challenge Astron Belt. Same theme, different images and largely different effects. Equally as good though.

guide to the equipment

GRAND PRIX: Taito threw their considerable weight into the battle for laser game sales with this considerable game. It was the first driving game—Taito tend to stick with what they do best!—to hit the laser market and was a brilliant combination of cartoon images and inter-related genuine film. Bound to emerge as one of the leaders.

M.A.C.H. 3: Perhaps the leader at present, the Mylstar Electronics game has certainly attracted the lion's share of the media and trade press attention—although we should temper that with the realisation that the Atari piece has not yet really been thrown into the ring. A super game of aerial warfare.

GOAL TO GO: Another Stern game and one with very dubious appeal outside North America because it is all about American football. Real film sequences are used and interfacing with the player is strong. The North American sales alone could prove immense, so we're sure that Stern are not bothered about the rest of the world with this one.

NFL FOOTBALL: Within weeks of AMOA's launch of Stern's Goal To Go, Bally-Midway launched this American football game, but the work that has gone into it makes it obvious that it has been in research and development for some considerable time. A tie-up with the National Football League itself on promotion will undoubtedly help the game, even without the heavyweight plugging that Bally-Midway's resources can provide. The game processes close to one and a half billion bits of data, Bally's Robert Mullane claims.

LASER SHUFFLE: A video card game with a simple laser connection built in the US by Status Game Corporation. Depending on how you do with the card game, a film sequence appears with a suitable comment from an old feature film or a specially shot sequence. Novel and comparatively inexpensive to put together.

VIDEO TURF: The company of the same name in the United Kingdom manufacture this horse racing game through Summit Coin. Very much a gambling game in which the player places his bets in coin acceptors and plays the odds against a real horse race, Video Turf has a precise but lucrative market all of its own.

MUSIC too has its laser-operated products and the first to be announced in early October was one from Wurlitzer, the West German manufacturers. Only a prototype of their unit linked to a Philips Laser Vision player has yet been seen, but the advantages of using laser discs instead of tapes is obvious and by the time ATE International opens at the end of February everything should be complete.

LASER VIDEODISC: From Videodisc Jukebox Inc., an American company, this was one of two laser disc jukeboxes to be launched at the AMOA show in October. It is probably too early to say whether this particular product is everything one would expect.

LASER VIDEO MUSIC: This was another at AMOA, this time from Laser Disc Computer Systems Inc. and again, it did not appear to be totally complete.

»

Early comparisons back Gil Pollock's argument

CINEMATRONICS' Dragon's Lair was one of the earliest of the current laser disc games to go on to a London arcade site and is now starting to give figures over a sufficiently long period to draw direct comparisons with other games.

The operator of the Casino in Tottenham Court Road is John Stergides, better known as the managing director of manufacturer and distributor Electrocoin Automatics. The arcade is, however, a major part of his business, sited as it is directly below his offices.

It is one of London's prime test sites, a busy high street location in which the top games can always be found on test—even before they become hit games.

A midweek lunchtime visit found the arcade crowded with a wide cross-section of the community, much wider than one would have imagined. The really fascinating thing about the experiment we were about to undertake was that we could for the first time directly compare Dragon's Lair, a laser game, against Atari's Pole Position and Star Wars, two excellent standard video games. Pole Position is still regarded as one of the strongest video products to emerge in the past year, while Star Wars is considerably newer but with a somewhat reduced reputation, compared with its compatriot.

Talking figures is not, we consider, a policy either necessary or wise. In these circumstances the performance could equally be assessed by rating the income of the laser game as 100 per cent for that week and expressing the income of the other games as a percentage of that figure. For the first nine weeks in operation, the comparative figures were as shown in our chart which follows on Page Sixteen.

Don Bluth and partners Gary Goldman and John Pomeroy—the trio who spent six months on the classic animation featured in Cinematronics' Dragon's Lair.

»

DISCS OF TRON

ENTER THE EARNINGS ENVIRONMENT

Enter Bally Midway's New Discs of Tron environmental game and experience the three dimensional world of profitability. From its cabinet and controls to its game play, Discs of Tron is a masterpiece of engineering. But because your investment requires more than a great package at a great price, Bally Midway has designed Discs of Tron with long run earnings in mind. A new research program with over 16 weeks of field testing has proven Discs of Tron's top-of-the-list consistency.

We'd like to prove it in the toughest location—yours! Sample Discs of Tron at your Bally Midway Distributor. You may be surprised but you won't be disappointed.

Bally MIDWAY

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
Dragon's Lair	100%	100%	100%	100%	N/A*	100%	100%	100%	100%
Pole Position	54%	29%	61%	72%	——	83%	34%	45%	48%
Star Wars	54%	64%	104%	92%	——	122%	71%	59%	73%

*Not applicable—Dragon's Lair out of action.

It should be immediately pointed out that Pole Position was a considerably older game than either of the other two. For all that Star Wars was performing well, it has a somewhat less distinctive reputation and it was also very new in the arcade. Nevertheless, on the figures, it performed well, even out-taking Dragon's Lair on two occasions.

What the figures don't show is the comparative return over the nine week period over the whole arcade when compared with the establishment's previous nine weeks. John Stergides said: "This is the really important thing. I found no evidence that the results on video games dropped—in other words that people did not play the other games, choosing only to play the laser game. That means that all of the income from Dragon's Lair was, at least for me, extra revenue generated for the business.

"I also found that it was not just the same people spending more, but rather a case of more people coming into the premises, a different type of customer, more businessmen, for example. That tends to back up the arguments made by Gil Pollock, of Mylstar".

An interesting experiment is to compare all of the figures on takes and express them as a percentage of Dragon's Lair's overall nine week take. That gives us the following:

Dragon's Lair 100%
Pole Position 57%
Star Wars 86%

Star Wars, then, can be shown to have performed exceedingly well, perhaps forcing us to revise our estimation of the game, rather than suggest it is better to buy a Star Wars than a Dragon's Lair! The latter view could be underlined still further by a comparison of basic game costs. A Dragon's Lair sells for about £4,000, a Pole Position for about £2,300 and a Star Wars at about £1,800. Express that as a comparison of costs and you have the following:

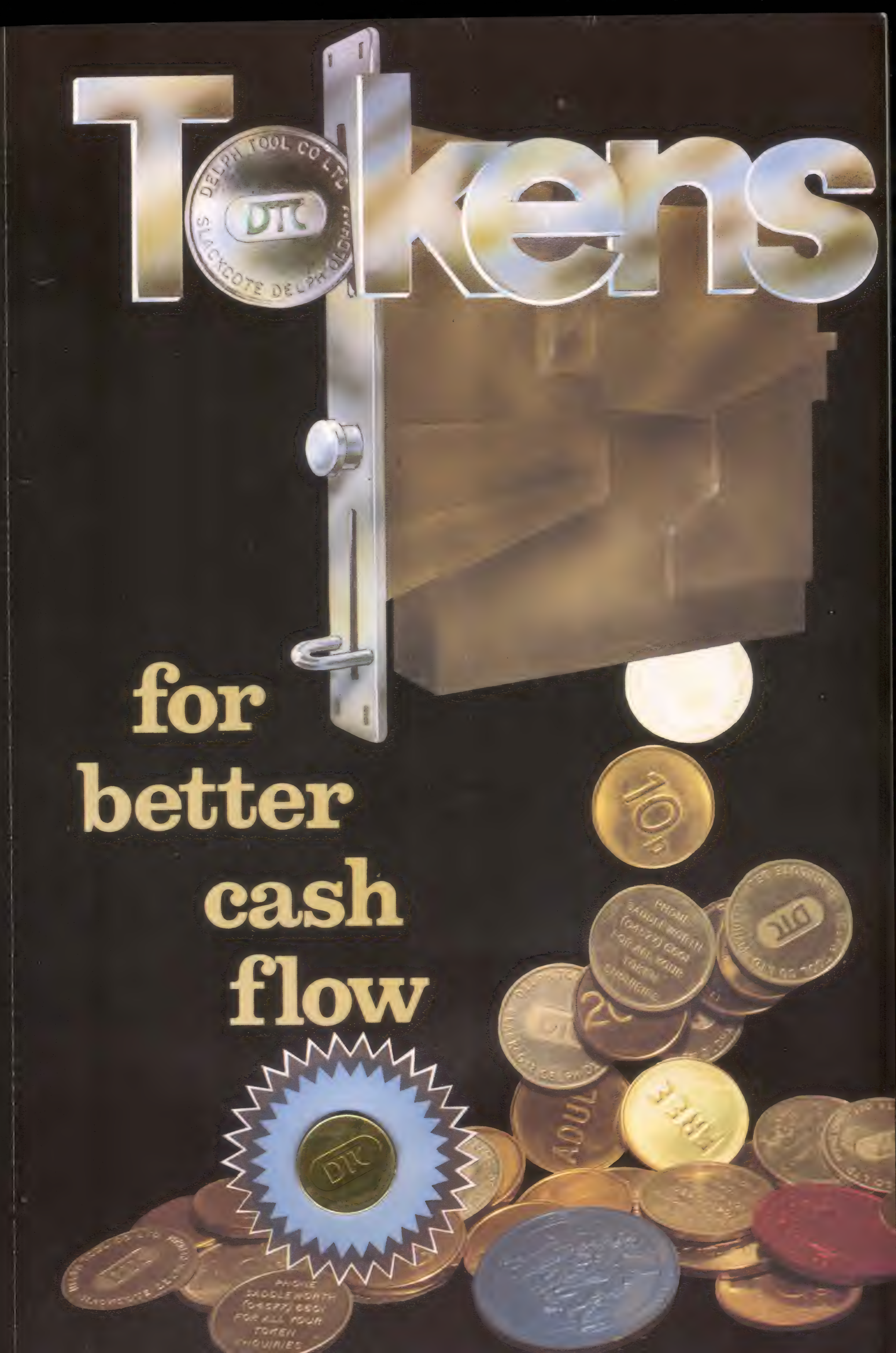
Dragon's Lair 100%
Pole Position 57%
Star Wars 45%

We're coming back to that conclusion again. Star Wars costs 45% of the cost of Dragon's Lair and yet takes 86% as much.

John Stergides added: "What you must remember here is that both the Pole Position and Star Wars figures are boosted by one extra week when the Dragon's Lair was out of action but the other two were not. You should also remember that Dragon's Lair is built to be re-programmed and it therefore has another 'life' when it starts to turn down, whereas the other two are not.

"And the most telling argument of them all is the fact that the introduction of Dragon's Lair to the arcade did not affect the take of the other machines but the arcade's take went up, so if you look at the Dragon's Lair take over the nine week period, that must represent all new income for the arcade. That's the important thing to me—and I'm quite satisfied".

»


Tokens
DELPH TOOL CO LTD
DTC
SLACKCOTE DELPH OLDHAM
for better cash flow
10p

DTC Tokens

Manufactured to order

Large or small quantities

Unbeatable prices

Delivery time halved

AMUSEMENT INDUSTRY

PRODUCT PROMOTIONS

DESIGNED TO YOUR SPECIFICATIONS

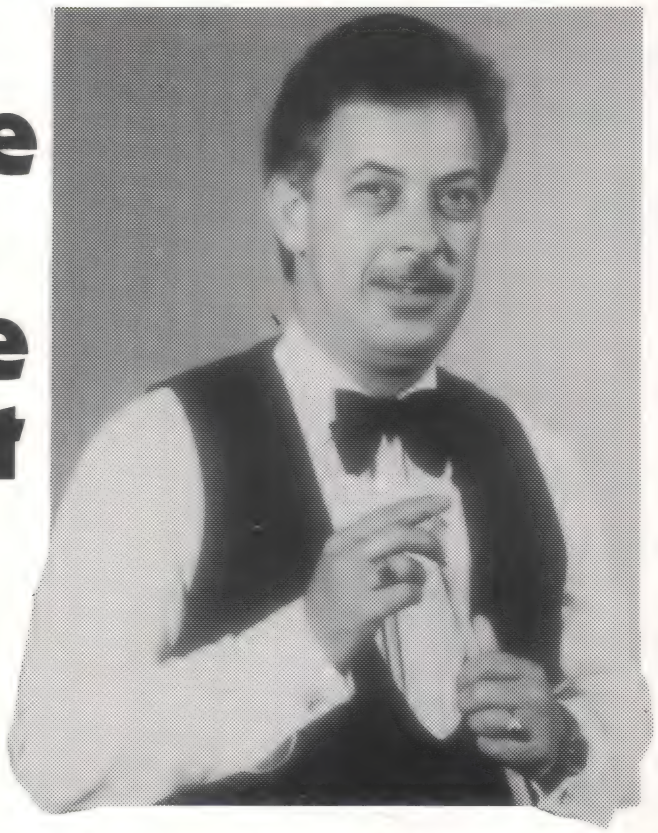
DELPH TOOL CO. LTD.

SLACKCOTE LANE, DELPH, Nr. OLDHAM OL3 5TW

TELEPHONE SADDLEWORTH (04577) 4797/6601

Covering Superleague in Hainsworth Top Table Pure Wool Cloth gives pool the all-important skill factor.

Pure new wool



When we started making our Superleague tables we wanted pool to be a sport and not just a bar amusement. We introduced many innovations in construction and design but the decision that most influenced the skill factor among players was the use of top quality wool napped cloth over the slate bed. Stop-shot, side, swerve... even a touch of bottom became common expressions in the pool-player's vocabulary—thanks to Hainsworth Top Table.

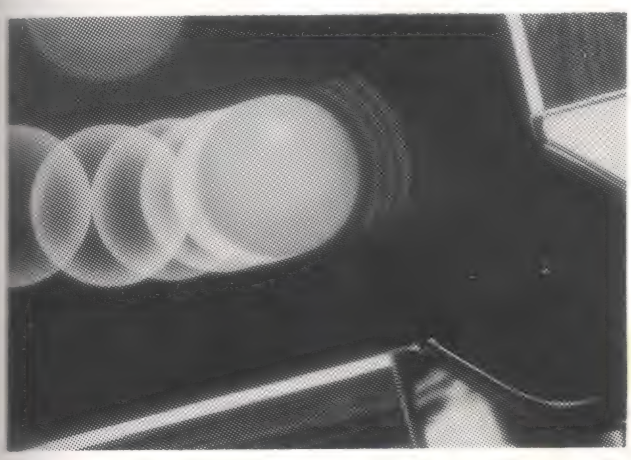
This Yorkshire-woven baize, frequently used in major snooker and billiards championships, is the product of years of development. For instance it was the first billiards cloth to be awarded the Woolmark. Its high-density short-nap surface is just right for pool players of all standards to develop their skills—because it is one of the few cloths that respond to expressions of skill.

Top Table is also the cloth we prefer to give our tables the smartest playing surface for play appeal, and the best prospects of long life through easy maintenance.

"I'm convinced it's a major contribution to the game's growth as a sport"

says Andy Loppas,
Winner of the recently televised Dry Blackthorn Championship.
UK Professional Pool Champion

In short it's made a major contribution to pool's growth as a sport—a major reason for both players and operators coming back to Superleague tables again and again.



SUPERLEAGUE

The Top Pool Table

with

Hainsworth

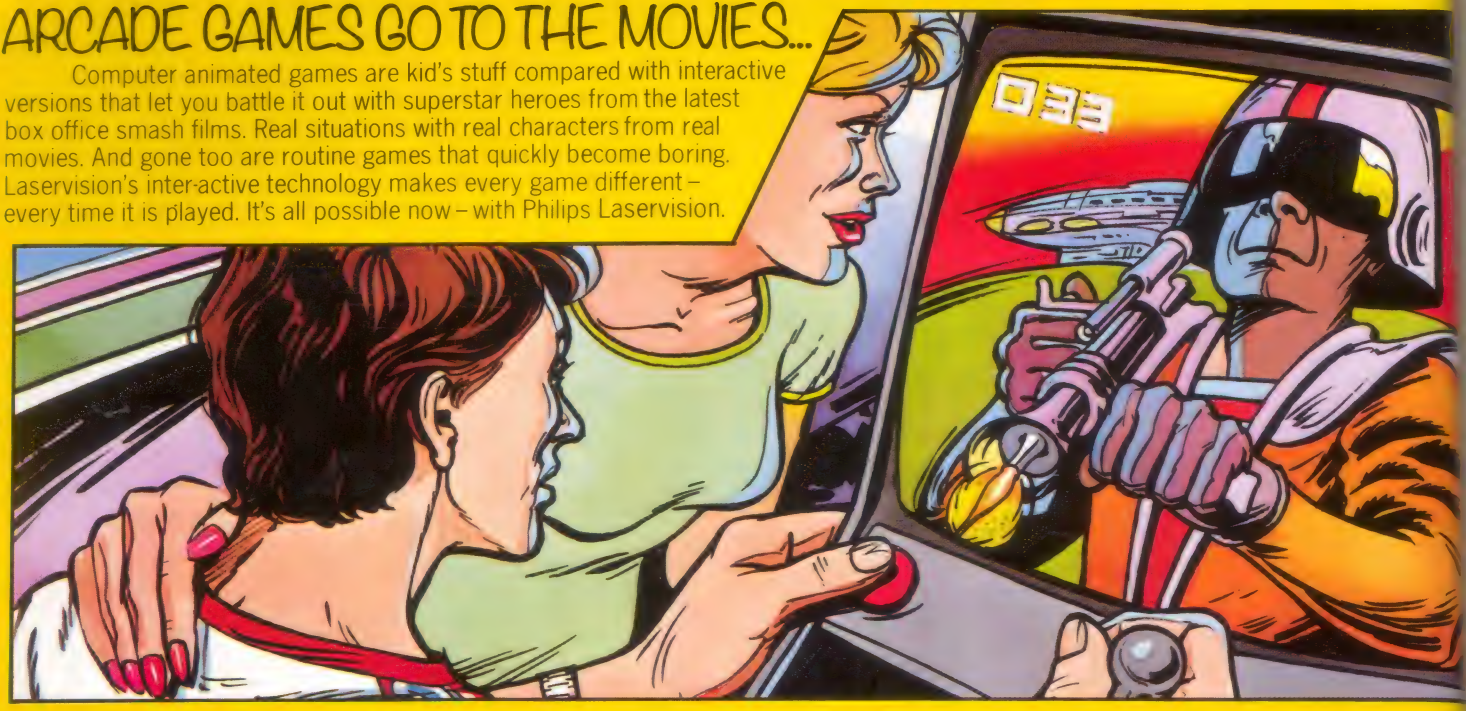
Top Table all-wool cloth

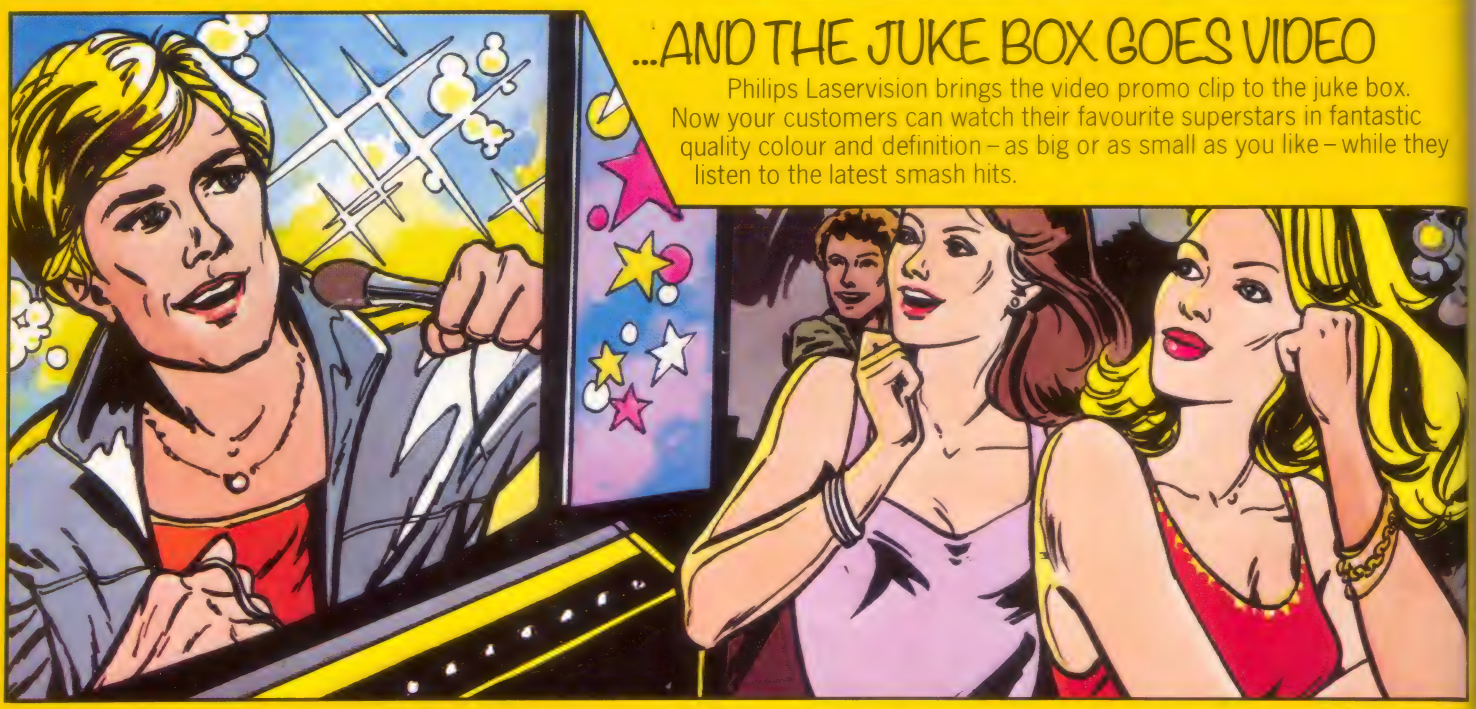
HAZEL GROVE MUSIC

HAZEL GROVE MUSIC COMPANY LIMITED. HEAD OFFICE, SALES SHOWROOM AND SPARES DEPARTMENT. BULKELEY HOUSE, STOCKPORT ROAD, CHEADLE, CHESHIRE SK8 2AA. TELEPHONE: 061-491 1068

ARCADE GAMES GO TO THE MOVIES...

Computer animated games are kid's stuff compared with interactive versions that let you battle it out with superstar heroes from the latest box office smash films. Real situations with real characters from real movies. And gone too are routine games that quickly become boring. Laservision's inter-active technology makes every game different – every time it is played. It's all possible now – with Philips Laservision.





...AND THE JUKE BOX GOES VIDEO

Philips Laservision brings the video promo clip to the juke box. Now your customers can watch their favourite superstars in fantastic quality colour and definition – as big or as small as you like – while they listen to the latest smash hits.

SEE HOW PHILIPS LASERVISION CAN REVOLUTIONISE YOUR BUSINESS!

The next big boom in the coin slot business is available now thanks to the highly advanced laser technology of Philips Laservision. Just consider a couple of the fantastic possibilities shown here.

There are two different types of Laservision discs – a 12" with up to 40 titles and an 8" with 15. Both types feature full stereo sound plus video and there's space for advertising spots between the tracks. The possibilities for new business from paying customers and advertisers are enormous.

Get in on the ground floor of a new super boom by writing or telephoning Philips today.

Philips Laservision. Building SFF 1,
5600 MD Eindhoven, The Netherlands.

PHILIPS

PHILIPS

Philips LaserVision

LaserVision

PERFECT PICTURE, PERFECT SOUND.

Wurlitzer '84

WURLITZER
means Music to millions®

For further information: Ruffler & Deith Ltd., 127 Wandsworth High Street, London SW18 4JB, Tel.: 01-8705238, Telex: 929222 or:
Deutsche Wurlitzer GmbH, D-4971 Hüllhorst/W-Germany, Tel: 5744-1001 ‹5050›, Telex: 972122

LASER GAMES: How the

THERE are those among us who would say that they still fail to fully understand video games, far less laser games.

That is hardly surprising. Most operating companies are small ones, probably still family-controlled or run by long-standing partners. In the main they cut their teeth on an industry dominated by mechanical or electro-mechanical machines.

Video games taught them a bitter lesson: Gone are the days when they could repair a machine with an empty cigarette carton and Sellotape. They had to employ "brains", studious young characters with degrees and nocturnal habits who could nevertheless make sense of an electronics diagram.

A natural resistance to the unknown in video games was certain to be even more pronounced with laser games—after all, those who make the decisions to buy were still working in the dark with the complexities of video games.

So how does a laser game actually work? We asked the question of several knowledgable sources and received fairly unintelligible replies, until we asked it of Abi Carmen, director of technical marketing services for Mylstar Electronics.

"We realise that there is a need to make a transition from conventional video games to the new laser disc games. Unless operators have at least a sketchy knowledge of how they work, how can we expect them to fully appreciate what they are buying?"

Mr. Carmen set out for us the basics of laser disc games in "baby language" which is our phrase, not his. And we are certain that most operators will not take offence from the use of the term. After all, we're learning too!

First, however, we look at the disc itself with the help of Philips—one of four companies already well to the fore in the laser disc field.

THE SYSTEM

LASERVISION is a video disc playback system which reproduces quality TV pictures and stereo or two-channel sound from pre-recorded discs. It has the characteristic advantages of a disc system: high-quality reproduction at relatively low cost, and convenient access to any particular passage on the disc.

As the name implies, Laservision employs a revolutionary optical playback technique. The recording is a reflective spiral track of densely packed programme information, sealed inside the disc, and it is read optically, by a laser beam.

The laser beam is locked on to the track by a servo-controlled optical system which maintains exact focus, tracking and synchronisation. The system consequently achieves exceptionally high picture and sound quality. There is no mechanical contact between disc and pick-up, so neither suffers any wear at all; even if the beam is swept radially across the tracks, no harm can be done.

One side of a disc can hold up to 90,000 broadcast standard video frames and two soundtracks, as well as code signals for player control, frame control and precision search. The total of 180,000 frames on two sides is enough for two hours play.

The gleaming silver recording with up to 90,000 picture frames per side is sealed inside the disc. It cannot wear and is highly resistant to fingerprints, dust and damage.

disc system functions

If, on the other hand, a single video frame is fitted into each disc revolution, any one of 54,000 frames on one disc side can be picked out and 'frozen' or frames can be stepped, sequences slowed down, speeded up, reversed. Any of these control modes can be held for very long periods without ever harming the disc. In this 'active play' format, a double sided disc will still give 1 hour 12 minutes of continuous play, but more significantly, the way is opened for a 'dialogue' between the disc programme and the viewer—and almost endless possibilities for amusement, education and new forms of information exchange now arising out of related developments such as the home computer.

The 30cm diameter of the standard-sized laser disc is the same as that of an audio LP (provision is also made for 20cm discs). Apart from normally being double-sided, however, there are no other similarities between the two. The most immediately striking characteristic of a laser disc is the gleaming mirror finish. It is very appropriate too, for this really is a magic mirror—and a very modern one.

The real difference, however, lies in the structure of the recorded information. In the place of a continuously modulated groove, the laser disc has a track consisting of a series of microscopic depressions (pits) in highly reflective plane surface. The pits are approximately 0.4μm wide and 0.1μm deep; the length depends on the encoding and varies between about 0.5 and 1.5μm. With a pitch of 1.6μm, the track is 60 times denser than that of an LP, and on a 30cm disc it is 31km long—enough for up to 90,000 individual picture frames, together with 2-channel sound and a great deal of control data. Thus an enormous amount of recorded information is compressed into a surprisingly small area. The minimum area needed for a complete frame is $0.6mm^2$.

A recorded track of this density is so vulnerable to dust and damage that any exposure to either would do irreparable harm. Unlike other video recordings, the Laservision recording is totally protected from this danger because it is inside the disc. The surface of the disc, in fact, is the 'back' of the polymethyl methacrylate (Perspex of Plexiglass) 'carrier' on which the recording is pressed. A double-sided recording is made by bonding two single recordings together.

In principle, Laservision discs can be made in the same way as conventional gramophone records, by compression or injection moulding. They undergo the same stages of mastering the replication, but the production process is different in many respects because the final product is of much higher technological level. A number of production stages require completely dust-free clean room conditions.

First, a master recording is made. This consists of a glass plate with a photosensitive coating on one side. The coded signal of the information to be recorded modulates the beam of a 100mW laser which 'writes' the information in the coating.

This 'cutting' is done on a real time basis, that is, it requires only as much time as the programme lasts. In principle, all normal video signal sources (camera, magnetic tape, slide and film scanner) can be connected to the master recorder. However, professional 1in. or 2in. magnetic recording tape is used almost exclusively as the programme carrier.

Exposure to the laser beam is followed by a photographic development process which leaves a pattern of pits on the master. Then, using a galvanic process, stampers are made, and these are used for disc production in a way similar to pressing gramophone records.

After pressing, on extremely thin aluminium coating, no more than about 0.04μm thick, is deposited on the information side, which is then sealed with a protective layer. Finally two recordings are bonded together to produce a double-sided disc ideal for music systems already available in the jukebox industry.

The recording on the disc consists of a series of tiny pits in a brightly reflective surface. When the laser beam falls on the flat surface, it is reflected. The effect of the pits, however, is to interrupt the beam reflection. As will be seen, the pattern of interruption is detected by a photodiode in the beam return path. By this means, all the information necessary for the complete audio-visual signal is retrieved.

How do the pits interrupt the beam? Two separate effects, multipath interference and beam diffraction, each play a part. The multipath interference effect arises from the facts that the light spot diameter is greater than the pit width, and that the pit depth is equal to one quarter of the wavelength of the beam. The part of the spot that does not fall into the pit is directly reflected. The part of the spot that falls into the pit is

"IS THIS THE PLACE WHERE A LASER HAS GONE BERSERK?"

»

also reflected, but on returning to the plane of the flat surface, it has travelled an extra one-half wavelength. It is thus in anti-phase to the light reflected at the surface, and the two components of the spot largely cancel each other out. The intensity of the reflection is greatly reduced.

Because the width of the pit is of the same order as the light wavelength, the pit also acts as a diffraction slit. Instead of being reflected back along its original path, the beam is radiated outwards over a wide angle. The result of these two effects is that the intensity of the reflected light is very small indeed in the presence of a pit.

There is a limit to the size of the details in the pattern variations (the information density) which can be detected. This is known as the maximum spatial frequency, and it is inversely proportional to the wavelength of the light, and directly proportional to the numerical aperture of the focusing (objective) lens.

Numerical aperture NA = in sin **a**

Where **n** is the refractive index and **a** is the angle between the optical axis and the outer edge of the focused beam.

The wavelength is determined by the type of laser, but the larger the numerical aperture, the higher the maximum spatial frequency. There is a very practical limit on the numerical aperture, however because the bigger the NA, the smaller the focal distance (the distance between the lens and the reflecting surface).

Philips Laservision system employs a helium-neon gas laser with a light wavelength of 0.63μm. With a numerical aperture of 0.4, a spot with a (half-intensity) diameter of 0.9μm is produced. At the operating speed of the Laservision player, this will read all the detail contained in the pit pattern.

With these dimensions, the presence of any dust or marks on the recording would completely spoil the reproduction. A unique advantage of Laservision optical readout is that this can never happen. The disc provides its own totally sealed protection; it is made of transparent Polymethyl Methacrylate (PMMA, Perspex or Plexiglass), and the laser beam has to pass through it to reach the recorded information which lies inside. Not only is the surface smooth, and easy to wipe clean, but provided that the thickness of the PMMA is substantial in relation to the focal length, dust, dirt or scratches appearing on the surface remain out of focus, and have little or no influence on the readout process. With the chosen thickness of 1.25mm, surface fingerprints, scratches and particles up to 75 microns in diameter are completely tolerable.

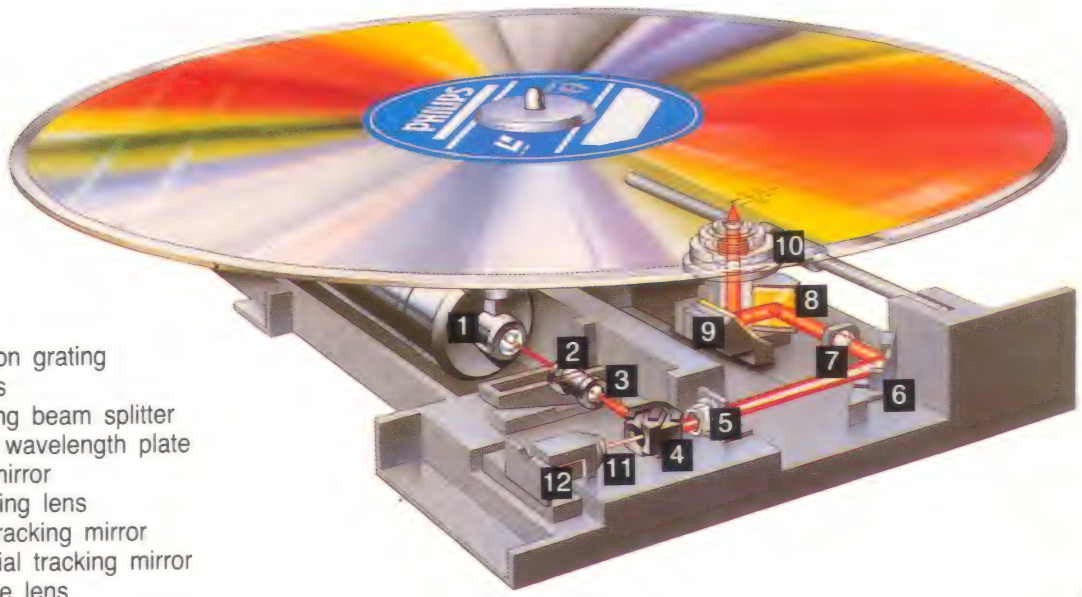
In the laser disc a single track of pits and flats carries all the information necessary for a colour video programme with stero sound or two separate sound channels, plus extensive control data for playback operations. At the same time, provision has been made for a number of extra facilities such as visual displays and supplementary control facilities.

The coding system developed in the Philips laboratories is principally designed to ensure optimal undistorted transmission of the luminance, chrominance and sound components of the original programme.

This has been achieved using a system of direct modulation. The colour sub-carrier does not have to be separated from the luminance component of the composite video signal. All the features embodied in the CCIR video standard (e.g. Teletext) can be incorporated directly, and only relatively simple single frequency demodulator circuitry is needed in the Laservision player for reproduction of a full-standard CCIR composite video signal.

The composite video signal is directly frequency modulated on to a carrier frequency of 7.5MHz. This gives an ideal sideband disposition and ensures minimal interference between luminance and chrominance components.

The two audio signals are modulated on to sub-carriers at 684kHz and 1066kHz. These are chosen for a minimal susceptibility to drop-outs, laser beam feedback and phase modulation by higher-order sideband components. The audio sub-carriers are then applied as pulse-width modulation to the video frequency modulation signal. The result is illustrated in greatly simplified form in the diagram on the right. The pulse-width-modulated waveform is used to produce the pits in the recording. The length and spacing of the pits is thus an analogue code for the complete video and audio signal.



1 laser
2 diffraction grating
3 spotlens
4 polarizing beam splitter
5 quarter wavelength plate
6 angle mirror
7 collimating lens
8 radial tracking mirror
9 tangential tracking mirror
10 objective lens
11 cylinder lens
12 photodiode array

THE PLAYER

The player consists of an electro-mechanical disc drive, the optical system for 'reading' the disc, and electronic circuits for audio and video processing and control.

The turntable is directly driven by a DC ironless rotor motor. The speed is locked to the line sync pulse rates as read from the disc.

To read the information on the disc from beginning to end, the read-out spot moves radially from the lead-in tracks at the inner radius of the recording to the lead-out tracks at the outer radius. To achieve this, a motor-driven sledge carries the necessary optical components along the radial path below the disc.

The objective lens travels on the sledge. It is mounted in a tubular bearing, and moves up and down under servo control. By doing so, it follows all the up and down movements of the disc—movements which are inevitable because of the tolerances involved in both disc and player manufacture. As a result the readout spot stays exactly focused on the information plane in the disc, irrespective of vertical disc movement

Also on the sledge are the tangential and radial pivoting mirrors. These, too, are servo-controlled. They deflect the beam respectively along the radius and along the tangent of the disc track. By this means, radial tracking is held to within fractions of a micron, and time synchronisation to within a few nanoseconds (thousand millionths of a second).

Other optical components include the helium-neon laser, a diffraction grating, spot lens, polarizing beamsplitter prism, quarter-wavelength plate, cylindrical lens and photodiode assembly. These may either be fixed, or mounted on the sledge, according to the player design.

The path of the laser beam, outward to the disc and then back to the photodiode assembly, is shown above. The 1.5mW helium-neon laser produces a coherent and highly directional light beam, linearly polarized and at a (visible) wavelength of 0.6328μm. The diffraction grating splits the single beam into three sections with relative intensities 1:3:1 (higher order diffractions constitute less than 10% of the light and are not used). The main beam is used as the information 'pick-up', and the two lesser beams are for radial tracking. The spot lens adapts the light beam to the entrance pupil of the objective lens. Its focus is imaged by the other light path components via the reflective disc on the photodiode. The polarizing beamsplitter reflects or transmits light depending on the direction of polarization. Light entering the prism from the laser is reflected onward towards the disc; on the return path, because the polarity has been changed by 90° in the quarter-wavelength plate, the light is transmitted straight through towards the photodiode. The quarter-wavelength ($\frac{1}{4}\lambda$) plate rotates the polarization of the light. In two passes, forward and return, polarization is turned through 90°. An angle mirror folds the light path to hold it within the space available. The collimating lens adjusts the beam into an accurately parallel path so that system operation becomes independent of path length. The radial tracking mirror is pivoted vertically to deflect the beam radially with respect to the track for track following and picture control. The tangential mirror is pivoted horizontally to deflect the beam along the tangent of the track for time error compensation. The 20 x N.A. 0.40 objective lens images the 'reading' spot in the plane of the information track in the disc. It moves vertically under control of the focusing servo. The Laservision disc has an internal reflecting surface with a recorded information pattern. It reflects or diffracts light according to the pattern. The cylinder or astigmatic lens adjusts the shape of the light spots focused on the photodiode. The spots are circular when the disc is in correct focus, elliptical when it is not. The photodiode array is the light detector. It is in fact a 3-diode array in which the two outer diodes pick up tracking information, while the central, four-segment diode 'reads' the recording and also provides the control signal for the focusing servo.

»

THE ABI CARMEN GUIDE TO LASER DISC GAMES

GIL POLLOCK, left, runs the rule over the laser disc while talking to Taitel service personnel in London.

STEP-BY-STEP

THE difference between a conventional video game and a laser disc system is the addition of a video disc player and the colour/sync board assembly.

Proper operation of the video disc player must be the initial step in any troubleshooting sequence. Many so called "electronic" problems may be actually due to improper disc and player maintenance.

- Store extra discs in an upright position.
- Clean discs with a glass or plastic cleaner with a soft non-abrasive lint free cloth.
- Do not use alcohol based cleaners as this may attack the plastic coating on the disc and destroy it.
- Discs should be cleaned a minimum of once a month and more frequently if the game is in a dusty area.
- Clean the air filter a minimum of once a month and more frequently if the game is in a dusty area.

STEP 2

The next stop, as depicted in the system block diagram, is distinguishing the major components, or sub-system as you may, and understanding where information (data) comes from or goes to. The arrows designate each major signal/power flow, or origin. For example, looking at the video disc player and its video out signal, the information flows to the colour/sync board which in conjunction with outputs from the A-1 logic board assembly are combined and output to the monitor. *See diagram on Page 28.*

STEP 3

A little more complex, but equally important, is a brief understanding of the theory behind each major assembly.

The bottom panels main functions are to filter, fuse and transform the 115V AC input voltage to supply power to the power supply board for rectification and distribution. It also supplies the video disc player with 115V AC via the video disc outlet.

The power supply board is extremely tolerable to input line voltage variations. All output source voltages are guaranteed to be stable for line voltage variations from 95V AC to 135V AC 60 Hz. The regulated logic +5V DC level is rated at 6 amps maximum and includes over-voltage crowbar protection. Four LEDs on the power supply board indicate that the associated voltages at the outputs are present.

The power supply board also houses the sound boards output amplifier, a TDA 2002.

The logic board consists of three major areas: the game machine, the graphics machine and I/O (input/output).

The game machine consists of the microprocessor, the decoding circuitry, RAM and ROM (program storage).

The graphics machine consists of the components that generate the display graphics. This would include the 5 MHz dot clock, the 9-bit horizontal dot counter, the 8-bit vertical line counter, the foreground and background registers, the vertical and horizontal registers, the buffers and the colour registers.

The I/O components allow the logic board to communicate with the service panel, the control panel and the sound board for sound commands.

The logic board must also communicate with the colour-sync board for multiplexing the chroma-luma processor RGB output with the graphics machine RGB as well as an external system block to synchronise the state machine clock and the video disc synchronisation signals.

Communication with the interface board is necessary so that the game machine knows what the current frame number of the video disc is, so that the correct graphics information can be displayed for the correct frame time.

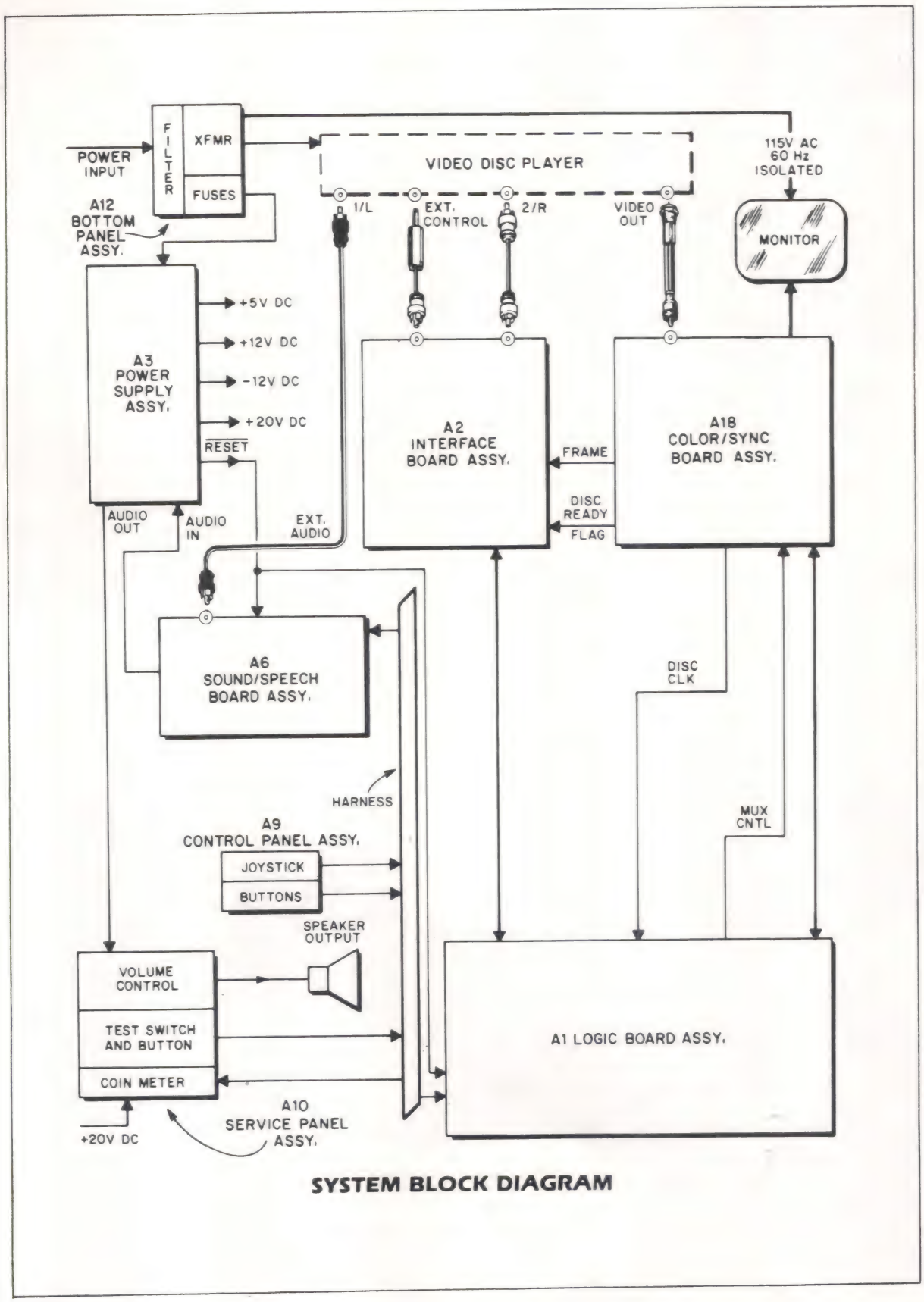
The colour/sync board has six major functions:

1. Sync separation of HSYNC and VSYNC from the video disc.
2. Strip the frame number from composite video from the video disc and to convert it to a TTL compatable signal for the logic board.
3. Decode composite video to RGB from the video disc. The chrominance and luminance are stripped from the composite video signal and pass through the chroma-luma processor which decodes the composite video to RGB.
4. Multiplexing of the video disc RGB and the graphics machine RGB.
5. Phase lock loop to adjust the graphics system clock so that the video discs' DHSYNC and the graphics HBLANK match in phase and frequency. This is accomplished by use of a comparator, a loop filter and a voltage controlled oscillator (VCO). If the HBLANK signal received by the phase comparator from the computer system is slower than that received from the sync separator from the video disc, the difference signal is fed to the VCO which forces the VCO to speed up, and vice versa. This produces signals from the video disc and the computer system that the two can be multiplexed for display on the monitor.
6. Generation of the video disc ready flag. The disc ready flag tells the program logic that valid composite video is being produced from the video disc player.

The interface board is the game machine's interface to the video disc player. The board has four functions.

1. Frame number decoder. The frame number code is stripped from the video signal and is received at TTL levels from the colour/sync board. The detector detects a valid frame number and produces the clocking signal that latches the frame number into latches which are read into the game machine.
2. The audio track decoder receives data from audio channel 2 on the video disc. It decodes the signal to extract digital data and stores data in RAM until the computer system is ready to read it.
3. Command controller. The command controller is the means by which the game machine sends instructions to the video disc player, i.e., play, reject, still/step, etc.
4. Disc ready flag. The colour-sync board send a TTL level signal to the interface board called the disc ready flag. This signal is high when the video disc player is producing valid video.

»



SYSTEM BLOCK DIAGRAM

»

The sound board consists of two 6502 microprocessor systems, a dual DAC, and L.P.C. speech generator, two programmable sound generators, input ports to receive commands from the game logic board, external audio input and a low level audio output, which is sent to the power supply board for amplification.

Mylstar Electronics, utilises a Pioneer Laser Disc brand video disc player and reflective disc. The video disc has encoded composite video information including picture, synchronised pulse and audio data. The pulse data identifies a unique frame number pre-assigned to each video frame.

TWO CHANNELS

The video disc player also produces two completely discreet audio channels from the audio data on the reflective disc. Audio is stored on channel 1/L while target data is stored on the channel 2/R.

The audio channel 1/L is routed to an audio summer on the sound board while the audio channel 2/R is routed to the audio decoder on the interface board.

The composite video signal is sent to the sync separator (U10) and to the colour decoder (U1) on the colour-sync board. The colour decoder decodes the chrominance and luminance from the composite video signal and produces an RGB signal via the chroma-luma processor (U1 on the colour/sync board).

The RGB output from the computer system and the RGB signal from the chroma-luma processor are multiplexed (U2) and sent to the monitor.

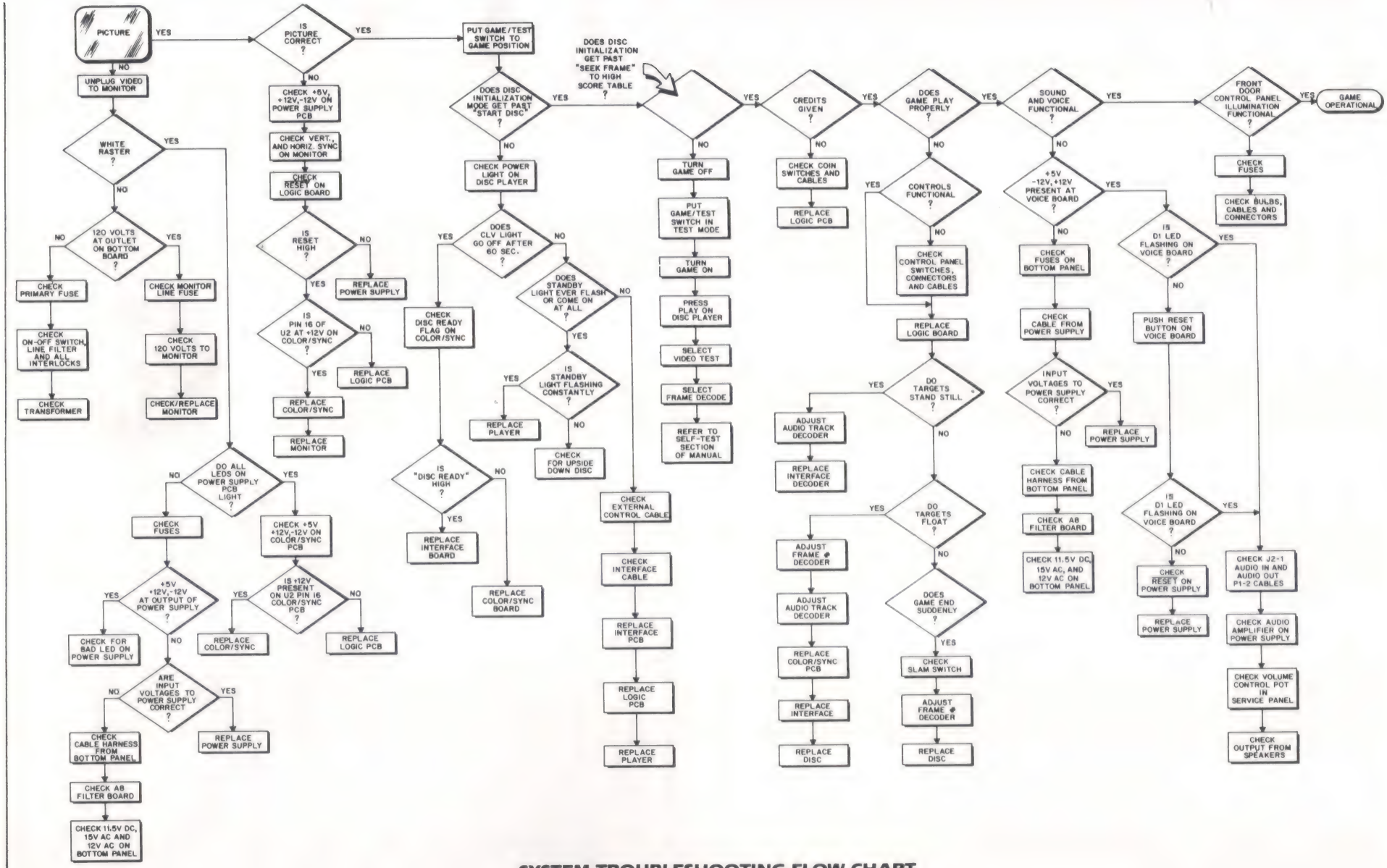
The composite video signal from the video disc is asynchronous with the rest of the system, especially the video produced by the computer system. The composite sync is separated from composite video by the sync separator to produce the horizontal and vertical synchronisation signals. The sync separator produces an external vertical sync pulse, DVSYNC, which resets the vertical counters causing vertical synchronization between the computer graphics image and the video disc image. The sync separator also produces an external horizontal sync signal, DHSYNC, which is coupled to a phase comparator (U6) of a phase locked loop (PLL) circuit also on the colour/sync board. The PLL also includes a voltage controlled oscillator (VCO) (U5).

Besides the DHSYNC, the phase comparator also receives a horizontal synchronous signal which is related to the system clock of the computer graphics system. The comparator compares both signals for phase and frequency differences and produces a difference signal. The difference signal is filtered by the loop amplifier and sent to the VCO. The VCO then generates a signal, DISC CLK, which becomes the system clock of the computer graphics system.

The troubleshooting flow chart graphically displays a subsequential approach to isolating and correcting a problem that may occur. *See chart on Page 31.*

In conclusion, the video disc system is not as complex as perceived, and following a logical step by step troubleshooting routine will help the operator/technician keep their video disc games to a minimum downtime.

»



SYSTEM TROUBLESHOOTING FLOW CHART

PIRATES:

IF not actually routed the video game pirates, who in their heyday were costing legitimate manufacturers countless thousands of pounds in lost machine and PCB sales, are now very much on the run.

The days when the pirates would blatantly advertise their illicit wares in the trade press are now a thing of the past and all the signs are that, while piracy may not have been totally stamped out it's a far smaller problem today than it was.

Some of the credit for this, of course, goes to the companies who have waged war on the pirates in the courts of this and other countries. However, this is not the sole reason for the waning activity of the video game copiers.

Market forces such as falling machine sales and rising production costs, coupled with increased design sophistication which has made copying harder and more expensive have also combined to discourage the pirates from their activities. The plain fact of the matter is that piracy now has nothing like the incentives it used to.

There has, of course always been a season for the pirates. It has coincided with the 'buying season'—the first months of the year when the machine users traditionally go shopping for new equipment. Recent months have seen next to nothing in the way of court activity over game piracy but this was only to be expected anyway, say the experts.

They believe the telling time will really come in the new year. This is when any pirates still in the business will be making and attempting to sell their wares.

However, in the words of UK solicitor Gordon Day who has been responsible for handling High Court legal actions in a good few video game piracy cases: "The climate has certainly changed, not just here, but worldwide".

He says that court action, here and in the rest of Europe while obviously playing a part in the battle against the pirates, has only been one factor in forcing them to scale down their activity.

"Effective action in the American and Japanese courts has, and will in the future, have much more effect worldwide on the problem generally than the action taken in the High Court here", he says. "Japan, as the principle source of the pirated goods which have found their way into this country is clearly at the root of the problem".

In the eyes of Gordon Day and others involved in the legal side of the battle, the series of decisions taken in the Japanese courts recognising that video game software was protected under Japanese copyright law and that its infringement constituted a criminal offence were of major significance. This led to the imprisonment of a number of copiers and the deterrent of a possible jail term has done a great deal to scare off the remaining Japanese copiers. That has had a valuable knock-on effect in reducing the problem both in the UK and elsewhere.

But, the fall off in piracy has been contributed to by other important factors as well as legal action. At one stage in the early days of videos, manufacturers could sell virtually as

Very much on the run

ONE of the most significant rulings in the video game copyright battle in the UK came in the High Court in the fight between Sega and John Richards and Trolfame. Although there has been no definitive ruling on where, if at all copyright lies in video games, the words of Mr. Justice Goulding in his judgement in this case have been followed by other judges in applications for interim injunctions in video game copyright actions.

He said: "On the evidence before me in this case I am clearly of the opinion that copyright under the provisions relating to literary works in the 1956 Copyright Act, subsists in the assembly code program of the game Frogger.

"The machine code program derived from it by the operation of part of the system of the computer called the assembler is to be regarded, I think, as either a reproduction or an adaptation of the assembly code program, and accordingly for the purposes of deciding this motion I find that copyright does subsist in the program.

"It is not necessary for me to say anything at this stage about the other heads of copyright claimed, because if there is copyright in the program that is enough *prima facie* evidence of infringement for me to have, to consider whether the plaintiff should have interlocutory relief".

---

many machines as they could produce. And, with demand at its peak the pirates similarly shared this happy situation of being able to sell virtually all they could churn out.

Now, however, video sales have dropped and neither manufacturers nor pirates have any guarantee of sales. The loss of an assured market has therefore taken a lot of the financial incentive out of piracy.

Then there is the cost of copying. Wise to the dangers of being copied many manufacturers are now deliberately designing software in such a way that boards cannot readily be converted from one game to another as they used to be in the less sophisticated days.

"The price differential between the genuine article and the copy has narrowed considerably, and with copies being much harder and more expensive to produce these days this is making piracy less worthwhile".

Another contributory factor to the drop in pirate activity has been the general shortage of video components. Even legitimate manufacturers are faced with problems at times and would-be pirates can certainly expect to suffer from this shortage.

The picture, therefore, is a much brighter looking one than it has been for some years, as far as this particular trade problem is concerned. In no particular order: worldwide legal action; a general drop in the market for video equipment; increased production costs; and more sophisticated machine designs aimed at making copying more difficult, have all combined to hit the pirates hard.

However, at the height of the legal action here there is no doubt that the threat of High Court injunctions did help a number of legitimate companies deter those with a mind to copying their games. Companies such as Williams Electronics, Sega, Atari, Taitel and Data East all took successful court action to protect their equipment. These actions served as a useful deterrent.

They made the pirates think twice before they copied equipment produced by companies which they knew were prepared to go to court.

Jim Pryde of Data East saw this happen. Data East and Taitel issued writs against more than 20 people at the beginning of 1983 over alleged copyright infringement in Burgertime.

The following game brought on to the market by Data East and again sold by Taitel was Burnin' Rubber. Very few copy versions of this appeared on the market here and Jim Pryde is convinced that this was because of the action taken over Burgertime. They had shown they were prepared to take court action and the pirates decided to steer clear of their games.

The practical result was that Burnin' Rubber, enjoyed higher legitimate sales than its heavily pirated predecessor.

One interesting aspect of the legal action taken here is that no case has ever been fully fought to its conclusion so there is no definitive ruling on where, if at all, copyright does in fact lie in a video game.

However, in the absence of such a ruling the views of Mr. Justice Goulding in the action by Sega against John Richards and Trolfame over alleged piracy of Frogger have been taken as giving a lead.

Mr. Justice Goulding ruled that for the purpose of granting an interim injunction there was a sufficiently arguable case that copyright existed in the assembly code of computer programs and that the machine code was also almost certainly protected by copyright. Other courts dealing with later cases have followed this view.

Looked at overall, therefore, it does seem that significant strides have been taken by one means or another to combat piracy. The courts have cracked down and market forces have taken the incentive out of piracy.

The telling time comes in the new year but certainly all the pointers are towards considerably less pirate activity in the future than in the past.

The case to be made out of piracy does not seem to be there anymore. And without the big profits to be made the risk is not worth taking, especially when the threat of being dragged up to the High Court is still as real as ever.

The bleak years

THE GOLDEN AGE of the SLOT MACHINE

By NICHOLAS COSTA

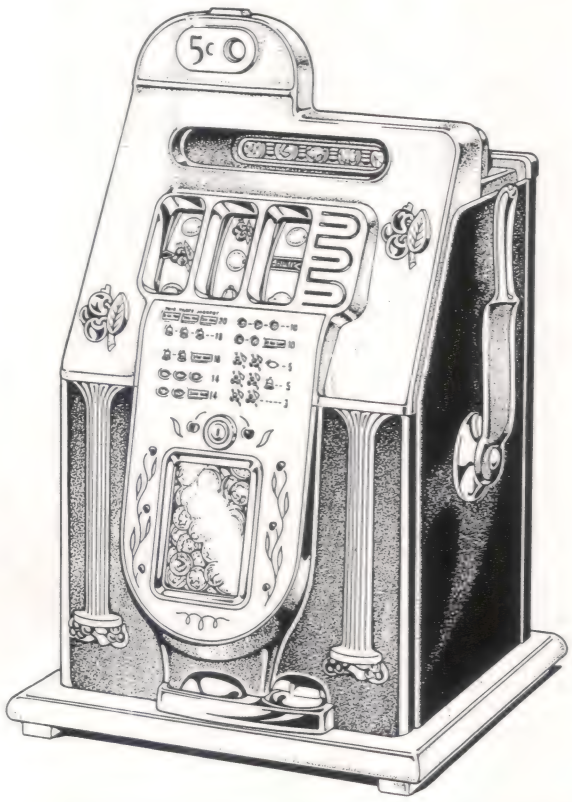
THE tightening up of the latter half of the 30s had considerably reduced the overall profitability of the manufacturing companies. As noted, to survive they had to diversify. The entry of America into the war did nothing to ease their difficulties. As with other countries many companies closed down never to reopen. Those that remained were commandeered for war work, so that for the next three or four years no new machines were produced.

In the specific case of the Mills Novelty Company diversification even forced a change of name. To maintain profitability they had engaged in producing among other things, soft drink dispensing machines, refrigerator compressors, air conditioning equipment, ice cream freezers, and motion picture projectors. Dealers in these lines pressed that the name of the company be changed, its association with automatic gambling machines was felt to be detrimental. The change finally came following the awarding of a contract for the manufacture of bomb release mechanisms by the British Government who were initially reluctant to place any such order with a mere novelty company. On September 1, 1943 the Mills Novelty Company became the Mills Industries Incorporated.

A subsidiary company was established, the Mills Bell-O-Matic Corporation, in order to market the companies post war line of slot machines. It was the first of the manufacturing companies to launch an entirely new machine at the end of the war. The first model, the Black Cherry Bell, was in fact advertised in June 1945, two months before the war ended although deliveries were not made until October of that year. In the following year it was joined in production by two other models, the Golden Falls and the Club Royale, though the latter was essentially a revamped pre-war club "Console" model. Both the Black Cherry and the Golden Falls had been designed by Grant Shay the then advertising manager of Mills Industries, however neither machine was a radical departure in styling or design from the late pre-war models.

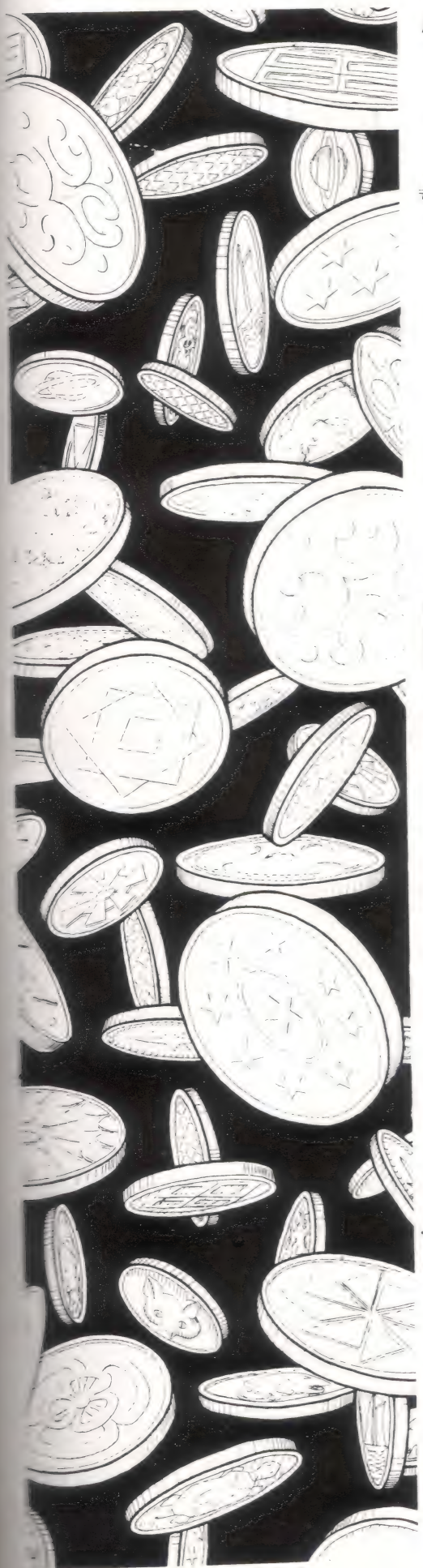
In February 1947 the Bell-O-Matic Corporation launched the high top Jewel Bell as the first of an entirely new range of machines designed by Everitt Eckland, who had by this time set up in business as a freelance designer having left the company during the war. The high top design was to prove to be one of the most enduring and widely imitated styles of the three-reel genre. The Jewel Bell was followed in January 1949 by the launching of other models in the new high top range, the Black Beauty Bell, the Blue Bell, and the Token Bell.

In the same year, in response to the success of the high top range Jennings launched the Sun Chief. It was their latest model in a long line of machines whose origins lay in the launching of the "One Star" Chief in the summer of 1935. The long term success of this range was to make names of "Chief" and "Jennings" synonymous symbols of mechanical reliability. Of all the many Chief cabinet designs the Sun Chief was the brashest. It was chrome plated rather than painted, and the by now traditional bas relief emblem of an Indian chief's head was replaced by a gleaming three dimensional bronze bust of the venerable Indian located directly above the Jackpot window. The Sun Chief was to have the rare distinction of starring in a film called "White Line Fever" in which it featured as the contraband cargo.



1945 MILLS GOLDEN FALLS

»



ANNOUNCING THE FIFTH ANNUAL

AOE 84

"Worth its weight in gold!"

"... an experience that any game owner or operator should attend!"

"Super learning experience!"

"Excellent! Encore! Encore!"

"It is necessary that people in an industry meet at conventions and exchange ideas."

It all adds up!

THE industry event — bigger & better than ever!

March 9-11, 1984
The O'Hare Expo Center
Chicago, Illinois

THE AMUSEMENT OPERATOR'S CHOICE!

- More New Seminars!
- More Exhibits — Over 600 Booths!
- Watch for Exciting Announcements!

Sponsored by *Play Meter* Magazine
Managed by Conference Management Corporation

To receive your FREE brochure, send in the coupon below.

AOE c/o Conference Management Corporation
17 Washington Street, P.O. Box 4990
Norwalk CT 06856

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

TELEPHONE _____

CS

Despite a short post war boom in the automatic field things went very badly for the parent Mills company. Important deals relating to the manufacture of Coca-Cola vending machines, and juke boxes specifically the Panorama which incorporated a film cassette unit were badly mismanaged, resulting in great financial loss to the company. By 1948 although still solvent Mills Industries was experiencing great difficulties in meeting its obligations. It was put into a protracted state of receivership and in 1954 was finally liquidated. As Fred Mills later explained: "We were forced into Chapter Eleven bankruptcy and lost propriety to the products and the patents. We had to shrink everything down to liquidate. The guy who was brought in to do the job was ruthless, he just got rid of everything, the huge factory premises, all the fine equipment. The people who bought it stripped it down and made about $2,000,000. In 1941 the business had been valued at $10,000,000. It was a great shame, a a great loss". Despite the demise of the parent company the Bell-O-Matic Corporation managed to survive and prosper in the bleak years to come.

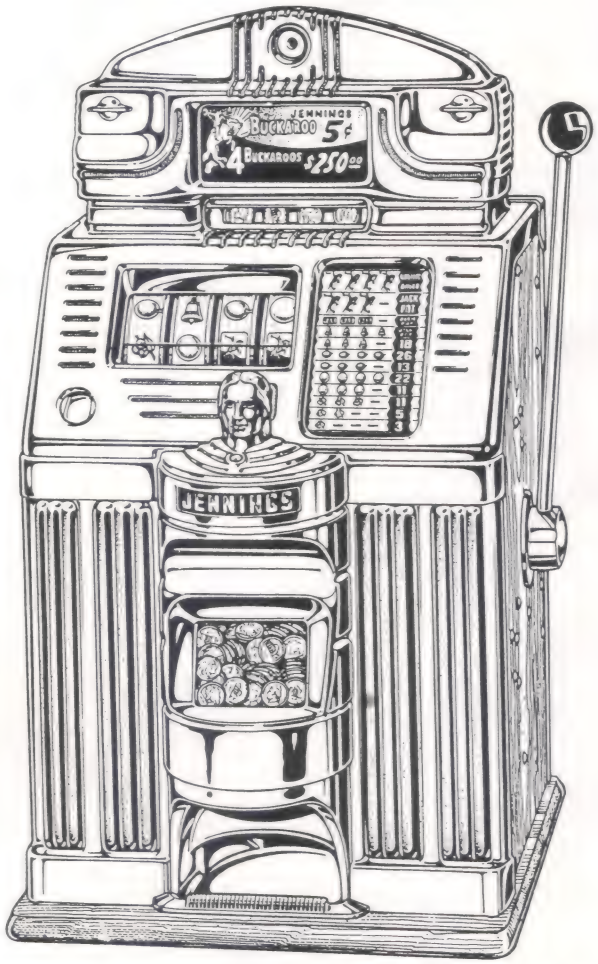
As this instance shows the late 1940s and early 1950s, despite an initial post war boom, were to be no golden age for the manufacturers. A new wave of anti-gambling fervour swept the nation following investigations into racketeering, but in many ways fostered by the rising, ultra conservative McCarthyist ascendancy in America. A Federal Bill was proposed which among other things sought to ban the interstate shipment of gambling machines—a move disastrous in its implications to the manufacturing industry.

In response to this the industry united in December 1949 to form the American Coin Machine Manufacturers' Association, with Herb Jones of the Bally Manufacturing Company as its president. Its aim was "to work for the good of the entire industry". The effort was futile. In January 1951 the Johnson Bill became law. It enacted that any violators of the law would face a $5,000 fine and two years in prison. The law effectively made it illegal to manufacture, recondition, repair, sell, transport, possess, or use any gambling device in any land under the exclusive Federal Jurisdiction. The manufacturers worst fears had come true. In February of that year Herb Jones was quoted by the trade journals as saying, rather lamely: "So far as I know all manufacturers affected by the bill have already stopped making them. They stopped last week". He added that some of the manufacturers were going into defence production for the Korean war.

The law also enacted that any state wishing to exempt itself from the Federal Bill was able to enact a special law to this end, and thus permit the shipping of gaming devices into its area. This might have raised some hopes since two states Nevada and Maryland were to settle for this option. However they were soon dashed for the Chicago-based manufacturers following the passing of a law by the Illinois State Legislature prohibiting all out of state shipments. As a token of defeat the short lived American Coin Machine Manufacturers' Association was dissolved to a backdrop of intensive F.B.I. activity against unlawful interstate trafficking of machines.

The Chicago based manufacturing companies that could not move had no option but to switch to new production lines or go out of business. The 1950s therefore were very lean years for the automatic gambling machine in America with few companies of any note left in the manufacturing field.

In 1931 the State Legislature of Nevada had passed a bill which legalised all forms of gambling, except lottery, within the state. It was passed at a time when the mineral mines, which were the main industry in the state, had become uneconomic due to the depression. The new law was seen as a way of attracting people and business into the state. In the eyes of the national press it was seen as an experiment that was bound to fail. However in the pre-war years the growth of Nevada as a gambling centre remained retarded, but as the anti-gambling laws in the rest of America grew progressively stricter, culminating in the Johnson Act of 1951, Nevada and especially the towns of Reno and Las Vegas became an increasingly attractive proposition for the diverse elements connected with the gambling industry. As a consequence its real development as a national gambling centre dates only from the immediate post war years. It was in Nevada



1960 JENNINGS BUCKAROO

therefore that the manufacture and use of the three reeler was largely maintained and increasingly flourished during the lean post war years.

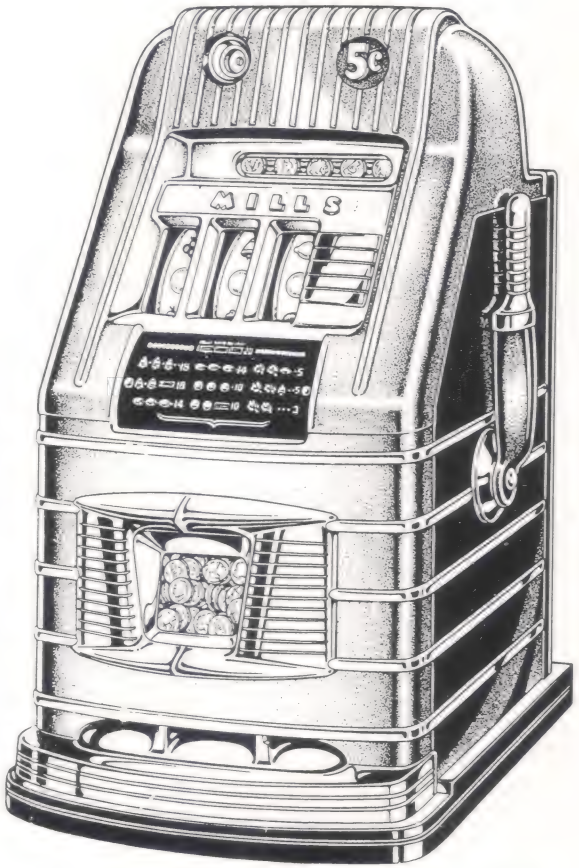
In 1948 the Buckley Manufacturing Company, who had entered the slot machine field by revamping old Mills machines during the war, launched a new machine, the Criss Cross Bell. This machine incorporated a major new feature which had previously been developed by the company for use on their revamped models. It was the Tic Tac Toe, which as its name suggests made provision for an extra automatic payout (of 18 coins) if the three bar symbols appeared on the reels regardless of whether they were on the central win line. This effectively added 12 more winning combinations to the payout schedule and liberalised the machine, thus making it more attractive to play. Its appeal also lay in its element of surprise, the player happily accepting a payout when no obvious combination had been made, especially since only some of the combinations had been listed on the award chart. The idea was an immediate success, especially so in Nevada which at that time was buying up machines wholesale. It rapidly became Buckley's most important trading area, so that by the time of the Johnson Act the firm had become firmly entrenched in Nevada and was little affected by the law's implementation. The feature was of course taken up by others. In the same year Jennings launched the Standard Chief Tic Tac Toe Bell. Mills also brought out a special over-and-under version of the Jewel Bell which later became the 21 Bell, which featured instead of bar symbols, the number seven.

MACHINE DESIGN

The rise of Nevada as a centre for gambling led to changes in machine design. The earliest of these related to the jackpot. The laws of the state placed no limit upon the money that could be won from a slot machine as long as that money was guaranteed and attainable. To this end machines for the Nevada market were made which by-passed the conventional automatically loaded jackpot, enabling them to be either hand loaded, or to offer sums of money much vaster than any machine was able to pay out automatically, in which case the lucky player was paid in cash by the house. The change in design of the Pace machines of the late 40s is an instance of this, whereby the traditional twin jackpot window was dropped in favour of the handloaded Jumbo Jak-Pot or Guaranteed Jak-Pot windows.

Another instance of how the Nevada market affected machine design was the introduction by Ace (one of the successors of the Pace Manufacturing Company) in the early 1950s of the front opening cabinet which facilitated the cleaning and servicing of a machine by the location. Up until that time access to the mechanism was solely by means of the back which in many instances necessitated moving the machine. What in many respects was a minor innovation led in the long run to radical changes in the machine's design.

As noted earlier, the response of the industry when faced with hard times was to seek solutions which would enable the machines to be used despite the laws made against them. Although much depleted in



1947 MILLS JEWEL BELL

numbers, the 1950s were to prove no exception to this rule for manufacturers. This time however the laws formulated were so strictly worded, and so stringently applied that the ploys of earlier years proved largely ineffectual.

In 1953 Taylor and Company of Chicago, an electrical components manufacturing firm, launched a remote control electrical unit for use on converted slot machines. The device's success lay in its questioning of the legal definition of what constituted a coin-operated gambling machine. The unit was in fact an updated version of an earlier ploy, which as already noted had been tried out some 30 years earlier by such companies as Eljay in England. If no coin was directly required to play a machine and no money was directly forthcoming from the machine, then under the strict letter of the law it was not a coin-operated gambling device. In practice an operator would retain control of the unit. An intending player would pay him for whatever number of plays he wished. The operator would then work the unit so that it released the handle on the machine for the desired number of plays. The machine could then be operated in the normal manner. If the player won, the operator would pay out (under the counter). No coin entered or left the machine, on the front of which invariably appeared the words "For Amusement Only". In practice the unit had only a marginal success,

»

since it could only be used in areas where the local laws had been either poorly or loosely worded. However it remained in manufacture throughout the 50s, ultimately proving to be a poor substitute for the real thing it suffered the same fate of the earlier devices. In 1953 Jennings also launched a machine which made use of this device, which was marketed as the Joker, and was manufactured in amputated form without coin slot or payout cup.

CONSISTENT MOVE

As referred to earlier. Nevada law set no limitations on the amount of money that could be won from a slot machine so long as that money was guaranteed and attainable. Historically there had been a consistent move on the part of manufacturers to increase the amount of money that a machine was capable of paying out automatically in an effort to radically increase its play appeal. The introduction of the jackpot in the 1920s was a direct result of this. However it proved for a long time mechanically impossible to greatly increase a machine's capacity to pay out automatically and reliably. The introduction of the Gold Award idea by Mills in the early 30s was accepted as an answer to this problem, and as time went by this feature became increasingly important, so that by the 1950's all big jackpots were being house paid. The electrical Console units proved to be only a temporary solution. In 1947 Jennings launched a machine known as the Challenger Console Bell which featured a live jackpot and was capable of paying out automatically up to 1,200 coins. However with the ever increasing importance of Nevada and the legal stipulation that all payouts had to be guaranteed and attainable the Consoles ultimately lacked both the necessary reliability and capacity.

Indeed the problem was to defy adequate solution until 1960. In that year the Automatic Coin Machine Equipment Novelty Company of Las Vegas launched the Acme Roulette Console, an automatic roulette machine giving a player 40 betting options on each spin of the ball. However by the following year, because of the machines faulty technical performance production was stopped and it was consigned to oblivion. Despite this it has in recent years gained a new historical significance, in that it now appears to have been the first automatic machine to incorporate the hopper payout system, which has proved to be the solution to the mechanical payout problem.

BRAINCHILD

The hopper payout system is generally ascribed as being the brainchild of Mike Wichinsky, a former New York operator, who was working as a croupier in the early 1960s at the Sands Hotel in Las Vegas. The system consisted of an electrical computing unit working in conjunction with a large capacity (over 1,000 coins) electric bank type coin hopper and counter unit. It could instantly register a win and pay out coins at an astonishing rate of six per second, and as such represented a major advance over all previous payout systems.

1949 MILLS BLACK BEAUTY

Wichinsky contacted Bally in Chicago, who were immediately interested in the system, and following the relaxation of the more oppressive of the anti-gambling laws in Illinois in 1963 were able to develop and produce it from their manufacturing base in Chicago. The result represented a return by that company to the slot manufacturing field after an absence of some 13 years. In 1964 they launched two new models, the Crusader and the Money Honey. The use of the hopper payout system enabled Bally to became ready leaders in the slot machine manufacturing field in what was then an expanding market. The Money Honey with its radical design, signalled the introduction of the electromechanical machine onto the world stage, which was in a short time to become a standard feature of the 1960s and early 70s. The development of the hopper payout system occurred at a propitious time, not only with regard to the demands of Nevada's casinos, but also in relation to legal developments in England, which was to provide the manufacturing companies with a greatly increased market for their products.

Illustrations from Slot Machines—a Pictorial Review by D. Christensen; Published by Vestal Press, New York, 1977.

INTERNATIONAL TRADE SHOW DIARY

1984

January 9-12	**Van-Expo, Horecava,** International Exhibition and Congress Centre, Amsterdam. *Organisers: RAI Gebouw BV, Europaplein, 1078 GZ Amsterdam. ☎ (020) 5411411. Telex: 16017*
January 12-17	**Intershow '84** Hamburg. *Organisers: Hamburg Messe und Congress GmbH, Jungiusstraße 13, Postfach 30 23 60, D-2000 Hamburg 36, West Germany. ☎ 040 35 691. Telex: 212609*
January 19-21	**Ima,** Frankfurt. *Organisers: Heckman GmbH, Messen & Ausstellungen, Kapellenstraße 47, D-6200 Wiesbaden, West Germany. ☎ 061/21/52 4071. Telex: 4186518.*
January 23-26	**Induferias,** Valencia. *Organisers: Feria Muestrario Internacional, Avda. de las Ferias s/n. Apartado 476, Valencia, Spain. ☎ 3640011. Telex: 62435—Feria E.*
January 31-February 2	**Northern Amusement Equipment and Coin-Operated Machine Exhibition,** Winter Gardens, Blackpool, Lancashire. *Organisers: Jack D. Rose (Exhibitions) Ltd., Exhibition House, 6 Warren Lane, London SE18 6BW. ☎ 01-855 9201. Telex: 896152.*
February 17-19	**Amusement Showcase International,** Expocenter, Chicago, Illinois. *Organisers: Amusement Game Manufacturers Association, 4300-L Lincoln Avenue, Rolling Meadows, Illinois 60008. ☎ 703 548-8044.*
February 28-March 2	**ATE International,** Olympia, London. *Organisers: Amusement Trades Exhibitions Ltd., 122 Clapham Common North Side, London SW4 9SP. ☎ 01-228-4107.*
March 9-10	**Amusement Operators' Exhibition,** Hyatt O'Hare Hotel, Chicago, Illinois. *Organisers: Conference Management Corporation, 17 Washington Street, Norwalk, Connecticut 06854, USA. ☎ 203 852 0500.*
March 28-29	**International Gaming Exposition,** Atlantic City, New Jersey. *Organisers: Conference Management Corporation, 17 Washington Street, P.O. Box 4990, Norwalk, Connecticut, USA.*
March 21-22	**Coin-Op '84,** Burlington Hotel, Dublin, Ireland. *Organisers: SDL Exhibitions Ltd., 68 Fitzwilliam Square, Dublin 2. ☎ Dublin 763871. Telex: 30664.*
March 29-April 1	**SADA,** Palacio de Congresos, Barcelona. *Organisers: Interalia, S.A., Diagonal 474, Barcelona 6, Spain. ☎ 93 218 58 50.*
April 14-23	**Milan Fair,** Fiera Campionaria, Internazionale di Milano, Milan. *Organisers: E. A. Fiera Milano, Largo Domodossola, 1, 1 20145, Milano MI, Italy. ☎ 49 971. Telex: 331360.*
October 25-27	**AMOA Exposition,** Chicago Hyatt Regency Hotel, Chicago, Illinois. *Organisers: Amusement and Music Operators Association, 2000 Spring Road, Suite 220, Oak Brook, Illinois 60521, USA. ☎ 312 654 2662.*

UK'S LEADING DISTRIBUTORS OF AMUSEMENT MACHINES.

BELL-FRUIT
AWP & CLUB MACHINES

J.P.M.
AWP & CLUB MACHINES

MAYGAY
AWP & CLUB MACHINES

ELECTROCOIN
VIDEOS

JAGUAR
POOL TABLES

HAZEL GROVE
POOL TABLES

We also stock **BARCREST & MARIAN**

C-T-Leisure (Leicester) Ltd. 45 Briton Street, Leicester. Tel. (0533) 546192/549328